



Thresholds related to renovation of buildings

EPBD definitions and rules

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EPBD definitions and rules



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1 Foreword

This work was initiated and supported by the Buildings Platform. The purpose of the investigation was to find the level of implementation of two thresholds mentioned in the Energy Performance of Buildings Directive (EPBD) in the European Member States (MS) related to renovation of existing buildings. These thresholds are:

- 25 % limits for when a renovation is to be considered major,
- 1000 m² limit on the building size for which minimum energy performance requirements must be met in the case of a major renovation if they are technically, functionally and economically feasible.

In addition to this information on best practice, legislation has been highlighted by the individual MS for other MS to learn from.

Information was gathered using a questionnaire and the report follows the questions and hence the answers from the individual MS. Answers from all MS related to one specific question are thus found in the same section of the report. Summaries across questions are collected where possible and presented in the Conclusions and recommendations section. The full questionnaire is shown in Annex 1. Tables with detailed textual answers only show the names of those MS that answered the questionnaire, while the overview tables show the names of all MS.

Sincere thanks to all the experts who kindly helped us with national information for this survey.

Danish Building Research Institute, Aalborg University
Energy and environment
January 2009

Thorkild Ærø
Director

2 Introduction

This study deals with the benefits and limitations of thresholds related to the 1,000 m² limit for existing buildings that undergo major renovation (EPBD Article 6) and the two 25 % rules regarding the definition of major renovations (recital 13).

EPBD: recital 13: *Major renovations of existing buildings above a certain size should be regarded as an opportunity to take cost-effective measures to enhance energy performance. Major renovations are cases such as those where the total cost of the renovation related to the building shell and/or energy installations such as heating, hot water supply, air-conditioning, ventilation and lighting is higher than 25 % of the value of the building, excluding the value of the land upon which the building is situated, or those where more than 25 % of the building shell undergoes renovation.*

EPBD: Article 6 – Existing buildings: *Member States shall take the necessary measures to ensure that when buildings with a total useful floor area over 1 000 m² undergo major renovation, their energy performance is upgraded in order to meet minimum requirements in so far as this is technically, functionally and economically feasible. Member States shall derive these minimum energy performance requirements on the basis of the energy performance requirements set for buildings in accordance with Article 4. The requirements may be set either for the renovated building as a whole or for the renovated systems or components when these are part of a renovation to be carried out within a limited time period, with the abovementioned objective of improving the overall energy performance of the building.*

As part of this study, a questionnaire (Annex 1) was circulated in the spring 2008 to representatives from the 27 MS of the European Union plus Croatia, Norway and Switzerland. Among these countries 25 answers were returned from: Austria, Belgium (Flanders), Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Italy, Latvia, Lithuania, Netherlands, Poland, Portugal, Romania, Slovak Republic, Spain, Sweden, United Kingdom (England & Wales), Croatia, Norway, and Switzerland.

A special situation exists in some countries, as legislation regarding requirements for building energy performance is defined on a regional level. This means that definitions of renovation may differ from region to region. In the case of these requirements this is true for: Austria, Belgium, Italy, and United Kingdom.

From the responses it was possible to get an overview of the current status of the benefits and limitations of thresholds regarding the definition of major renovation. The answers have been analysed in the best possible way and supplemented with knowledge from the project group.

This study presents the situation of the MS as of June 2008. The study is based on the information provided by the respondents and not on analysis of legal texts therefore omissions may be possible.

The content of this report follows the order of the questions in the questionnaire.

3 Conclusions and recommendations

A number of the questions in the questionnaire were such that the answers could be summarised in a limited number of answers. Answers to these questions are summarised in the table below.

Table 1. Summary of answers to questions that had a limited number of possible answers. The green column shows the summary for EU27. The yellow column includes Croatia, Norway, and Switzerland.

	AT	BE	BG	CY	CZ	DK	EE	FI	FR	DE	GR	HU	IE	IT	LV	LT	LU	MT	NL	PL	PT	RO	SK	SI	EP	SE	UK	HR	NO	CH			
	Austria	Belgium (Flanders)	Bulgaria	Cyprus	Czech Republic	Denmark	Estonia	Finland	France	Germany	Greece	Hungary	Ireland	Italy	Latvia	Lithuania	Luxembourg	Malta	Netherlands	Poland	Portugal	Romania	Slovak Republic	Slovenia	Spain	Sweden	UK (England&Wales)	Croatia	Norway	Switzerland	EU27	EU27+3	
1.1	Describe your national definition of a major renovation																																
More strict									x	x				x					x				x			x					6	6	
As EPBD	x			x	x	x					x				x							x			x						8	8	
More loose							x					x				x					x					x		x	x		5	7	
None		x						x												x								x			3	4	
1.2	How are the terms "technically, functionally and economically feasible" as stated in Article 6 of EPBD interpreted in the national implementation?																																
Definition	x					x			x	x			x	x	x	x				x		x				x	x	x	x	x	12	14	
No definition		x		x	x		x	x			x	x								x	x		x		x						11	12	
2.1	Describe your current national regulation regarding the implementation of the 1000 m² limit including any other requirements related to area limits:																																
More strict		x			x	x		x	x	x				x	x					x		x				x	x	x	x	x	12	15	
As EPBD	x			x			x					x				x				x	x				x						8	8	
More loose												x											x								2	2	
2.2	Planned national regulation regarding the implementation of the 1000 m² limit including any tighter requirements																																
Tightening planned							x	x							x																3	3	
No additional tightening	x	x		x	x	x			x	x	x	x		x		x				x	x	x	x	x		x	x	x	x	x	19	22	
3.1	Definition of energy performance requirements for renovated buildings																																
Building performance	x				x		x		x	x		x							x		x	x							x	x	9	11	
Zone performance																									x	x					3	4	
Component requirement	x	x			x	x			x	x	x				x	x			x	x	x	x	x			x	x				17	17	
None				x			x																								2	2	
3.3	Are the national requirements based on the CE labelling of the component or system, if it exists for the component or system?																																
CE	x					x			x	x	x				x	x			x	x	x	x	x		x	x					14	14	
National, overruling CE					x									x															x			2	3
None		x		x			x	x				x																	x	x		6	8
3.6	Are there fines or similar penalties when the requirements are not met?																																
Yes		x		x	x		x			x	x		x		x	x			x	x	x				x	x	x	x	x	x	14	17	
No	x						x		x	x	x		x											x	x						8	8	
3.11	Describe whether there is a link between renovation of buildings and your national certification scheme																																
Link					x	x	x				x					x			x	x	x	x			x						10	10	
No link	x	x		x					x	x	x		x		x								x			x	x	x	x	x	12	15	

The answers to question 3.6 may be ambiguous and consequently the section dealing with this question needs careful reading before making any conclusions.

Summaries of individual questions are found at the top of the relevant sections in this report.

3.1 Recommendations

This study shows that there are many different regulations concerning building renovation in the European MS.

The lists below suggest recommendations for the improvement of the EPBD including pros and cons of each suggestion.

3.1.1 Pros and cons regarding implementation of renovation thresholds in the EPBD

Based on the answers and the authors' experience, the following statements were extracted and grouped according to four different rules in the EPBD, namely the two threshold limits and the energy performance for buildings and building components.

Some general statements regarding the implementation of the EPBD were also extracted from the questionnaire:

- Focus on energy will increase the indoor quality of the renovated building. Increased airtightness does however need to be followed up by ensuring a sufficient ventilation rate.
- Renovation of buildings that comply with the requirements changes the building industry ethics and further the market price of building stock.
- Compliance with the different rules is not checked in all MS.
- It has proven to be important that energy saving measures have to be cost-effective within a specified period of time.
- Recommendations applied on a voluntary basis have much less market penetration than official rules.
- European legislation could give minimum requirements on overall building energy performance, but allow the MS to put up stricter requirements.
- Minimum requirements for individual components are used in many MS and seem easy to manage.

3.1.1.1 *The 25 % limits for major renovations*

Pro:

- Relatively easy to identify when a renovation is being considered major.

Con:

- It might be expensive and complicated for the building owner to comply with the regulations and it may lead to increased cost and a tendency to postpone renovations or to make them in smaller stages (less than the 25 % limits).
- Minimum requirements for individual components are easier to manage than the 25 % rules.
- Easy to identify when a renovation is considered being major, but meeting the minimum energy performance requirements still entails some up-front costs (in MS where this rule applies).
- A major renovation may come into effect due to the 25 % building value threshold in some regions while not in other regions for the "same" building. There are large regional differences in building prices.
- Recession may cause the value of buildings to drop. Major renovations due to the 25 % value threshold may thus cover more buildings and a larger part of the building stock will be forced to undergo energy improvements.

3.1.1.2 *The 1000 m² threshold*

Pro:

- Lowering the 1000 m² threshold will substantially increase the number of buildings affected and consequently the impact of the EPBD.
- At present, many countries have also renovation requirements for buildings of less than 1000 m².

Con:

- The administrative work load of building renovation might be significant if this threshold is lowered, as many small buildings will be included. The administration will though depend on the applied control mechanisms.
- Lowering the threshold may not necessarily have a major impact in EU as a whole, because many MS already have a threshold that is lower than 1000 m².

3.1.1.3 *Introduction of European minimum energy performance targets when renovating a building*

Pro:

- Such requirement will force certain MS to make their national requirements stricter.
- If well done, it will accelerate the implementation of stricter energy performance targets.
- Linking the energy performance in the certificate with a social housing subsidy scheme will increase implementation of energy saving measures.

- Introduction of minimum energy performance targets rewards good designers and technicians as this requires cooperation and a holistic approach to building renovation.

Con:

- The development of a coherent approach to expressing such requirement in the common EPBD text is not evident; it should take into account climate differences, differences in building styles and building use.
- Such minimum requirement should take into account the way market control is organised. At present, some countries have almost no control of legislation and strict requirements are therefore easy to demand, but are not being checked and compliance is consequently uncertain. Other countries have already a strict control scheme.
- Requires a large administrative system to control whether the energy performance of renovated buildings meets certain requirements.
- Could require introduction of fines or similar penalties if the energy performance of the renovated building does not meet the requirements.
- Compliance with energy performance requirements may hinder major renovations if the procedure for meeting the regulations is too complicated or too costly.

3.1.1.4 *Introduction of European energy performance targets for individual building components and systems*

Pro:

- Can be very appropriate for the renovation market.
- Can be proposed as an alternative target instead of or in combination with an overall energy performance target.
- Will encourage industry to develop more energy efficient products and supply them at a lower cost than special products.
- U-value requirements are rather simple to understand and to meet.
- Simple and easy to follow.
- Except for major renovation in the sense of complete re-cladding, elemental limits are to be preferred, as they are simpler to administer.
- May potentially establish a strong European market platform on energy efficient components and systems.

Con:

- May potentially open for too loose energy performance targets in MS who already have strict requirements.
- A U-value requirement will in some cases conflict with technical and functional feasibility of the measure.

4 Major renovations

2002/91/EC, recital 13 states that "Major renovations of existing buildings above a certain size should be regarded as an opportunity to take cost effective measures to enhance energy performance. Major renovations are cases such as those where the total cost of the renovation related to the building shell and/or energy installations such as heating, hot water supply, air-conditioning, ventilation and lighting is higher than 25 % of the value of the building, excluding the value of the land upon which the building is situated, or those where more than 25 % of the building shell undergoes renovation.

The objective of this Directive is to promote the improvement of the energy performance of buildings within the Community, taking into account outdoor climatic and local conditions, as well as indoor climate requirements and cost-effectiveness."

This Directive lays down requirements as regards: "(c) the application of minimum requirements on the energy performance of large existing buildings that are subject to major renovation."

4.1 National definitions of a major renovation

Definition of a major renovation differs significantly, ranging from a more gentle definition, on none at all, over the definition stated in the EPBD to a more strict definition. In Germany, for instance, the definition of a major renovation is transformed to the ratio of the building component with the same orientation that needs to be exchanged or renovated. For instance, if more than 20 % of windows facing south have to be replaced, minimum energy performance requirements for renovations have to be met, similarly with more than 20 % of the roof (here without taking the orientation into account). In addition to the 25 % threshold, several MS have special requirements for building components and systems when these are replaced or renovated.

Other countries have a more vague definition of a major renovation, e.g. the cost is significant compared with the value of the building, though without a precise definition of significance. In many countries the definition of major renovations only applies to renovation of large buildings, though a large building is not being uniformly defined (see 1000 m² threshold section).

In the 36 % of the MS that responded there is a definition of the 25 % rules that is similar to the definition given in the EPBD, and 27 % have more strict rules (forcing more buildings to implement energy saving measures) than the EPBD. Another 36 % have more loose rules or no definition of a major renovation.

Table 2. Definition of a major renovation in MS compared with the 25 % rule, stated in the EPBD. The green column shows the summary for EU27 and the yellow column includes Croatia, Norway, and Switzerland.

	AT	BE	BG	CY	CZ	DK	EE	FI	FR	DE	GR	HU	IE	IT	LV	LT	LU	MT	NL	PL	PT	RO	SK	SI	EP	SE	UK	HR	NO	CH						
	Austria	Belgium (Flanders)	Bulgaria	Cyprus	Czech Republic	Denmark	Estonia	Finland	France	Germany	Greece	Hungary	Ireland	Italy	Latvia	Lithuania	Luxembourg	Malta	Netherlands	Poland	Portugal	Romania	Slovak Republic	Slovenia	Spain	Sweden	UK (England&Wales)	Croatia	Norway	Switzerland	EU27	EU27 +3				
1.1	Describe your national definition of a major renovation																																			
More strict									x	x				x					x				x			x					6	6				
As EPBD	x			x	x	x						x			x							x			x						8	8				
More loose							x					x				x					x						x		x	x	5	7				
None		x						x												x							x				3					

Table 3. Question: Describe your national definition of a major renovation.

Country	Answer
Austria	Time-related renovation work on buildings with a total net floor area of more than 1000 m ² , if the total construction costs (construction costs, fees and associated costs) exceeds 25 % of the building stock (excluding the land value and the outside facilities), or if at least 25 % of the building envelope undergoes renovation, or if at least three of the following parts of the building shell and the technical building services ought to be renewed together or to be repaired for the most part: windows, roof or uppermost ceiling, facade, and building services engineering systems.
Belgium Flemish region	There is not a definition of major renovation. All works on existing buildings have requirements on U/R-values and ventilation. A specific type of renovation is an existing building larger than 3000 m ³ where min. 75 % of facade and the HVAC installation are replaced, it has the same requirements as new buildings (including energy performance). New parts of buildings larger than 800 m ³ or containing residential units, always have requirements like new buildings. When the new parts are smaller, only U/R-values and ventilation.
Croatia	Major renovation has not been defined yet.
Cyprus	The definition of major renovation is taken from preamble (13) of the Directive and more specifically "renovation" refers to renovation or extension or alteration related to the building shell and/or energy installations. ΚΠΔ429/2006. In the case of any major renovation the building shall at least comply with the minimum requirements set, to the extend that in the opinion of the Energy Service, it is technically, functionally and economically feasible.
Czech Republic	Act No. 406/2006 Coll. § 2 q): a "major change of a completed building" shall mean a change to a completed building which would affect more than 25 % of the total area enclosed within the perimeter walls of the building, or a change to the technical installations and equipment of the building that would produce energy impacts of a dimension such that the initial sum of the energy consumption values affected is greater than 25 % of the energy consumption total.
Denmark	The definition of a major renovation is taken from the Directive (25 % of the value of the building or more than 25 % of the building envelope). In addition, there are requirements to construction parts and systems. Furthermore it is required that some individual, profitable measures have to fulfil the requirements, regardless of the size of the renovation. These individual measures are insulation of external walls when changing rain shield, insulation of attic and roof when changing roof covering, change of boilers and change of heat supply. The 25 % rules do not cover single family houses - though it comes into force in case of a total renovation. For other building types, all profitable energy saving measures have to be applied if the 25 % limit is exceeded.
Estonia	Major renovation and principles, how the renovation can be categorised as a major renovation, are defined in the Building Act. According to the act, renovation is considered to be a major renovation, if the costs of the renovation are higher than one third of average construction costs of a similar building.
Finland	There is no definition for a major renovation.
France	The definition of a major renovation is taken from the Directive (25 % of the value of the building, building more than 1000 m ²). In this case, a limit of energy consumption has to be respected. In addition, when a small renovation is planned (building less than 1000 m ² or cost of renovation less than 25 % of the value of the building), some thermal characteristics are required.
Germany	The German energy decree of 26. July 2007 sets requirements for renovations (changes) either for building envelope components or for the primary energy demand of the whole building starting from 20 % of the envelope component area, for exterior walls, windows, glazed doors and roof windows starting from 20 % of the envelope component area with the same orientation. For extensions to a building from 15 m ² to 50 m ² useful floor area there are limitations

	of the U-values for the different new components. For extensions with more than 50 m ² the requirements for new buildings have to be met for the new building part.
Greece	The definition of a major renovation is taken from the Directive (25 % of the value of the building or more than 25 % of the building envelope).
Hungary	Cost of renovation of building envelope and/or mechanical system exceeds 25 % of the value of the building without that of the building site.
Italy	None, all renovations must meet the same requirements as the new buildings.
Latvia	According to the "Energy Efficiency in Buildings Law" major renovation is described as total floor area is larger than 1000 m ² and which total renovation expenses exceed 25 % of building cadastral value or which renovation works apply to 25 % of building construction volume. Cabinet of Ministers Regulations No.112 "General Construction Norms" published according to Construction Law Article 2 fourth part include 3 definitions: Reconstruction; Renovation; Restoration.
Lithuania	Building under major renovation – In the present Regulation building under major renovation means a building in which the costs of implemented energy saving measures will exceed 25 % of residual value of building under reconstruction or overhaul repair, the value of building site excluded.
Norway	Any work where the building is changed significantly is given a new character, and where more than 50 % of the building area is affected. <i>50 % of the building area</i>
Netherlands	The same conditions as for new buildings for which a building permit is needed.
Poland	No such definition, instead according to the amendment of Construction Act from 19th September 2007 art. 63 p.3, every reconstruction or renovation of building resulted in the change of building energy performance requires elaboration of energy certificate.
Portugal	When costs of the renovation exceed 25 % of the cost of building new, which is set nationally at 630 €/m ² (this is the maximum amount an insurance company has to pay on a policy in case of total destruction of an insured building - this cost is realistic for basic infrastructure in a building, but it does not really cover for nicer or luxury items, which must be insured separately and are not counted for the 25 % cost limit).
Romania	The definition of a major renovation is taken from the Directive (25 % of the value of the building or more than 25 % of the building envelope). The 25 % rules do not cover single family houses - though it comes into force in case of a total renovation. For other building types, all profitable energy saving measures have to be applied if the 25 % limit is exceeded.
Slovak Republic	Major renovation of buildings for purpose of this law adjusting of an existing building or its separately used part, which are interference with thermal protection through additional insulating of external walls and roofs through replacing of original opening constructions or energy equipments of the building those way, that it influences the energy performance of the building. Major renovation of the building could be realised one-time building adjustment or sequenced partial building adjustments.
Spain	It's the same than in the EPBD. But the rules are a little bit different for what about building and its installations: Major renovation for a building is "any work of enlargement, modification, improvement or rehabilitation" or any change on the building use: you must comply with the energy efficiency regulation of the Building Code (CTE) if you are making any of those changes in your building affecting over the 25 % of the building envelope of the building. In the case of the thermal installations of the building ANY change on it is considered "major renovation" for what about the mandatory compliance with the energy efficiency requirements derivatives of the EPBD: if you change the installation or renovate it or change the energy source or you change the use of the building you must comply with the energy efficiency requirements of the Thermal Regulation (RITE).

Sweden	For now, there is no definition of major renovation, though for all buildings, according to § 14 in the ordinance (1994:1215, BVF) of technical requirements on structural building etc, undergoing a change, the possibility of fulfilling demands on new buildings have to be considered. If the building area is increased, new building-demands have to be fulfilled and if the change of the building is within the climate shell, one should aim for the qualities in the building code. If there are obstacles such as cultural values or risk of losing other qualities of the building, the aim could be set lower than the building code for new buildings. Some part of major renovation could probably be within the interpretation of § 15 (BVF) If the climate shell is altered and the economical life of the building is largely prolonged, the demands on other parts than the changed part can apply to the "whole" building.
Switzerland	There is no national definition, but a general consensus that a major renovation implies that all occupants need to be relocated during renovation and that the capital investment is a non negligible part of the value of the building.
UK England & Wales	"Major works" are not precisely defined but explicitly include extensions; initial installation of any fixed building services; increase in capacity of any fixed building services.

4.2 Interpretation of the terms "technically, functionally and economically feasible" in the national implementation

The two first requirements, technically and functionally applicable for undertaking energy saving measures in combination with major renovations are relatively straight forward in most MS. It is a matter of the technical possibility to implement an energy saving measure in the actual building. The same goes for functionally feasible, which eliminates measures that will work poorly in the renovated building, both in terms of technology and in terms of indoor climate.

The third requirement, economically feasible, covers a large diversity. In Hungary for instance, the energy saving measures must be implemented regardless of the economy or cost effectiveness in the lifetime of the measure. In Portugal, Spain and Poland, a building undergoing a major renovation must meet the requirements as defined for new buildings. This may look like a very strict requirement, but it depends on the level of energy performance required for new buildings. In countries with strict requirements such a rule would be very difficult or costly to meet for existing buildings. This may in turn lead to less energy improvements in the existing building stock. In Denmark the measures that have to be implemented must be cost effective in 75 % of the lifetime of the measure. In 48 % of the MS, which answered, there is no clear definition of the term economically feasible with respect to energy saving measures in combination with building renovation. Some countries have transferred the feasibility terms into U-values or similar requirements based on detailed studies or experiences from demonstration projects.

Table 4. Definition of the terms "technically, functionally and economically feasible". The green column shows the summary for EU27. The yellow column includes Croatia, Norway, and Switzerland.

	AT	BE	BG	CY	CZ	DK	EE	FI	FR	DE	GR	HU	IE	IT	LV	LT	LU	MT	NL	PL	PT	RO	SK	SI	EP	SE	UK	HR	NO	CH		
	Austria	Belgium (Flanders)	Bulgaria	Cyprus	Czech Republic	Denmark	Estonia	Finland	France	Germany	Greece	Hungary	Ireland	Italy	Latvia	Lithuania	Luxembourg	Malta	Netherlands	Poland	Portugal	Romania	Slovak Republic	Slovenia	Spain	Sweden	UK (England&Wales)	Croatia	Norway	Switzerland	EU27	EU27+3
How are the terms "technically, functionally and economically feasible" as stated in Article 6 of EPBD interpreted in the national implementation?																																
1.2																																
Definition	x					x			x	x			x	x	x	x			x			x			x	x			x	x	12	14
No definition		x		x	x		x	x			x	x								x	x		x		x			x			11	12

Table 5. Question: How are the terms "technically, functionally and economically feasible" as stated in Article 6 of EPBD interpreted in the national implementation? Grey markings indicate that the answer may not be focussed on actual question.

Country	Answer
Austria	These terms are defined in the regional Austrian laws; in Austria, the EPBD transposition is carried out on the regional level (level of the 9 Austrian provinces) regarding the technical requirements; only the obligation to present the energy certificate is regulated on the federal level.
Belgium Flemish region	Are not used in the definitions.
Croatia	These terms are not interpreted yet.
Cyprus	National legislation does not interpret these terms in an outright and specific way. As mentioned above it is up to the Energy Service to indicate at which extend the compliance to the minimum requirements set is technically, functionally and economically feasible. Furthermore there is no criterion as to what and /or in what way should a major renovation be assumed to be technically, functionally and economically feasible. Nevertheless if a major renovation proves to be not technically, functionally and economically feasible is exempted from any compliance to the minimum requirements.
Czech Republic	Act No. 406/2006 Coll. § 6a, par.4: (4) The certificate issued for a new building having a total useful floor area over 1000 m ² shall include the results of the technical, environmental and economic feasibility of alternative systems such as: a) decentralised energy supply systems based on renewable energy, b) co-generation of electric power and heat, c) district or block heating or cooling, if available, d) heat pumps.
Denmark	To be a profitable measure, the saving (in currency) multiplied by the lifetime (in years) divided by investment (in currency) should be higher than 1.33. These measures will normally appear in the certificate from the energy certification scheme. Functionally and technically the solutions must be applicable. Furthermore the building conditions can cause that the requirements cannot be fulfilled in a profitable way. If a less comprehensive, profitable measure can reduce the energy consumption, this should be done, e.g. insulation of a cavity wall, where it is necessary to insulate internally or externally to fulfil the requirement – in this case only the cavity wall should be insulated if that is profitable. Energy saving measures that it can be argued affect the architecture of the building in a negative way does not need to be carried out.
Estonia	Further interpretation is not done on national level. It is in the competence of municipalities, if they consider the renovation to be a major renovation.
Finland	-
France	In the regulation, the level of the requirement depends on technical, functional and economical applicability. For instance, the level of thermal insulation required is lower in the South than in the North of the country, in order to take into account the economic optimum between the cost of renovation and the energy savings that it will lead. Technical feasibility is also taken in account, as the level of requirement is decreased when the classic solution of renovation is not applicable, or too expensive.
Germany	The German energy decree sets maximum U-values for different building envelope components or limits the primary energy demand to 140 % of the one for new buildings. Additionally the retrofitting of building systems installed before 1st October 1978 incl. the meeting of additional definitions are requested. Not yet insulated, but not workable but reachable ceilings to the attic have to be insulated with a maximum U-value of 0.30 W/m ² K.

	<p>By this the energy decree more or less defines what is technically, functionally and economically feasible. The bases for these requirements are studies and experiences on energy efficient and economy efficient retrofit solutions.</p> <p>There is a waiver included in the energy decree in paragraph 25 saying that the responsible authorities of the federal state can relieve the building owner from the requirements of the energy decree if they lead to undue hardship, meaning if the requested measures will not be paid back during the usage time.</p>
Greece	Functionally and technically the solutions must be applicable. An index of economic feasibility is not foreseen update.
Hungary	Requirements are obligatory disregarding financial aspects.
Italy	The requisites are calculated on the basis of internal VAN evaluations performed at national level.
Latvia	National law includes not only technically, functionally and economically feasible elements but also 2 additional elements - environmentally aspect needs to be taken into account in designing phase and municipalities have rights to accept their local called "binding rules" which is mandatory just in some particular region or territory.
Lithuania	-
Norway	We did not use this wording in the new requirements, as it corresponded quite well with the wording already in place in our building law. Here it is stated that requirements for new building also will be valid for work in existing building. The law opens up for giving exemptions to these requirements if it is difficult technically to fulfil.
Netherlands	The Energy performance coefficient must be fulfilled. It is up to the designer to make the choices concerning building - and installation concepts. The height of the EPC in the building code is fixed, based on measures which are available with a pay back time of less than 5 years.
Poland	There is only the general requirement that after a renovation the building should fulfil requirements for new buildings.
Portugal	There is no exception in the Portuguese regulations about this 25 % rule. Every building undergoing major renovation must be brought up to present regulations. The only exceptions are by typology (e.g., monuments and buildings of special architectural value are exempted).
Romania	<p>The profitability of a measure is established using some economic efficiency indicators as: net actual value – DVNA (m), the cost of energy saved unit – e, pay back time N, but it is analyzed also the possibilities of the owners.</p> <p>Functionally and technically the solutions must be applicable. There are accepted, if it is necessary, packages of solutions less comprehensive if they can reduce the energy consumptions.</p>
Slovak Republic	<p>Major renovation of buildings for purpose of this law adjusting of an existing building or its separately used part, which are interference with thermal protection through additional insulating of external walls and roofs through replacing of original opening constructions or energy equipments of the building those way, that it influence the energy performance of the building.</p> <p>Major renovation of the building could be realised one-time building adjustment or sequenced partial building adjustments.</p>
Spain	Those terms are not included in the Spanish Legislation. If you are under a major renovation you must comply with the building code requirements (CTE) and thermal regulation (RITE).
Sweden	Sweden implemented the CPD with the law (1993:847) on technical requirements of structural buildings etc. In this law it is said that structural buildings shall, in light of normal maintenance during a reasonable economical lifetime, fulfil the essential technical requirements ER 1- ER 6 plus 7 suitability for intended use, 8 be easy to access for disabled and 9 economical use of water and waste. This is the aim of all buildings, whether they are new or are to be altered.

Switzerland	Technically feasible is rather obvious: it is what is feasible according to today's knowledge. Functionally feasible is not defined. Economically feasible are investments that could be financed during their lifetime by increasing economical value, energy and other savings. An enlarged concept of "economically feasible" is investment that can be afforded by the building owner for his own pleasure. Many of today's investments for energy saving measures are done according to this enlarged definition.
UK England & Wales	No explicit definition but a list of 8 types of improvement that will normally be expected to meet these criteria.

5 1000 m² threshold

Member States should take the necessary measures to ensure that when buildings with a total useful floor area over 1000 m² undergo major renovation, their energy performance is upgraded in order to meet minimum requirements in so far as this is technically, functionally and economically feasible. Member States should derive these minimum energy performance requirements on the basis of the energy performance requirements set for buildings in accordance with Article 4 (Setting of energy performance requirements). The requirements may be set either for the renovated building as a whole or for the renovated systems or components when these are part of a renovation to be carried out within a limited time period, with the abovementioned objective of improving the overall energy performance of the building.

5.1 Current national regulation regarding implementation of the 1000 m² limit including any other requirements related to area limits

In general there are two approaches to the 1000 m² threshold; one follows the threshold as stated in the Directive; and one has practically no lower limit in terms of area of buildings that needs to comply with the rules for improvements of the energy performance in case of a major renovation. In most of these cases the lower area limit follows the general rule for new buildings in the national building regulations, typically between 10 and 40 m² as being buildings that must have a building permit. In the 55 % of the MS, which answered, there are rules that ensure that more buildings will have to implement economically efficient energy saving measures than if the area limit of 1000 m² was complied with.

Table 6. Definition of minimum building size that must implement energy performance improvements when undertaking a major renovation in MS. The green column shows the summary for EU27. The yellow column includes Croatia, Norway, and Switzerland.

	AT	BE	BG	CY	CZ	DK	EE	FI	FR	DE	GR	HU	IE	IT	LV	LT	LU	MT	NL	PL	PT	RO	SK	SI	EP	SE	UK	HR	NO	CH		
	Austria	Belgium (Flanders)	Bulgaria	Cyprus	Czech Republic	Denmark	Estonia	Finland	France	Germany	Greece	Hungary	Ireland	Italy	Latvia	Lithuania	Luxembourg	Malta	Netherlands	Poland	Portugal	Romania	Slovak Republic	Slovenia	Spain	Sweden	UK (England&Wales)	Croatia	Norway	Switzerland	EU27	EU27+3
2.1	Describe your current national regulation regarding the implementation of the 1000 m² limit including any other requirements related to area limits:																															
More strict		x			x	x		x	x	x				x	x				x		x					x	x	x	x	x	12	15
As EPBD	x			x			x				x					x				x		x			x						8	8
More loose												x												x							2	2

Austria is marked as having the same rules as stated in EPBD even though the answer is doubtful.

Table 7. Question: Describe your current national regulation regarding the implementation of the 1000 m² limit including any other requirements related to area limits.

Country	Answer
Austria	There are different solutions depending on the provinces in Austria.
Belgium Flemish region	1000 m ² (3000 m ³) is only used in one specific definition where renovation has the same requirements as new buildings. For other types of renovation, there is no threshold. When buildings new parts on existing buildings, the new part will be seen as a specific part that has to fulfil other requirements than the existing building. There is a limit of 800 m ³ , above: requirements as for new buildings, below: U/R-value and ventilation.

Croatia	<p>There is no limitation based on areas for retrofitting. Technical regulation concerning energy economy and heat retention in buildings covers all the buildings (and buildings renovation) except: 1. Workshops, production halls or warehouses which in conformity with their use must be open more than during half of their operation time if they do not possess in-built air curtains, 2. Greenhouses used for agricultural purposes, 3. Tents and similar temporary constructions which may be repeatedly assembled and disassembled and 4. Simple constructions regulated by a special regulation.</p> <p>When designing the reconstruction or the alteration of an existing building which is heated at a temperature above 12 °C, and when as a result of the construction intervention the volume of the heated section of the building increases by at least 30 m³, or when the design determined temperature increases in the section of the existing building of the area exceeding 30 m³, then the requirements of this regulation relating to the new buildings shall apply to these parts of the existing building. In other cases the heat flow coefficient U [W/(m² K)] of the whole construction section of that orientation where the construction work has been performed shall not exceed the values given in the regulation.</p>
Cyprus	National regulation does not include any other than the requirements of the Directive relating to area limits, thus includes all buildings with a total useful floor area over 1000 m ² .
Czech Republic	There is no limitation based on areas for retrofitting. The building regulation covers buildings more than 40 m ² , meaning that all buildings larger than 40 m ² must follow the rules in case of renovation.
Denmark	There is no limitation based on areas for retrofitting. The building regulation covers buildings over 10 m ² , meaning that all buildings larger than 10 m ² must follow the rules in case of renovation.
Estonia	The limit 1000 m ² applies to all building types, there is no exclusions or other limits applied.
Finland	For renovation work the National Building Code is applied in accordance with the Land Use and Building Act, Section 13: "The regulations in the Building Code concern the construction of new buildings. Unless other-wise specifically prescribed by the regulations, they are applicable to renovation and alteration work only in so far as the type and extent of the measure and a possible change in use of the building or part thereof require". In energy efficiency regulations there is no 1000 m ² limit.
France	There is no limitation based on areas. All buildings must follow the rules in case of renovation. Rules are different and more ambitious when the renovation is huge (25 % of the value of the building and building more than 1000 m ²).
Germany	<p>There is no limitation based on areas for retrofitting.</p> <p>There is however a limit used for extensions (see 1.1). It starts at 15 m² useful floor area and divides the extensions in 15 m² to 50 m² and above.</p>
Greece	There are no other requirements than the limit of 1000 m ² in case of major renovation (25 %).
Hungary	Major renovation and public buildings.
Italy	No relation between requirements and building size, the 1000 m ² step was used only to graduate the adoption of the building and certification measures.
Latvia	There is not specific area limits, we have new (adopted in Parliament on 13.03.2008.) Law.
Lithuania	<p>The building energy performance requirements are obligatory to: Buildings under major renovation with the heated area of 1000 m² or more. The energy performance shall be upgraded in order to meet minimum requirements as it is technically, functionally and cost-effective feasible.</p> <p>The predicted building energy performance at the design stage shall meet the requirements of the Regulation sections 25 and 26 for big buildings with the heated area of 1000 m² or more if major renovation is planned.</p>

	The energy performance class of the big buildings (building part) with heated area of more than 1000 m ² after major renovation must be not less than D. This requirement is valid for all buildings after major renovation, for which the completion of the design terms [3.9] is issued beyond the Regulation came into force.
Norway	We do not have a 1000 m ² limit, as major renovation in every existing building is affected – not depending of the size of the building.
Netherlands	The Dutch government includes all buildings with a floor area above 50 m ² .
Poland	According to the amendment of ordinance about Technical criteria to be met by buildings and their localisation, every modernisation, extension or change of functionality of existing building exceeding 1000 m ² requires fulfilment of the same requirements as for the new building.
Portugal	In the Portuguese regulations, every building undergoing major renovation must comply with the new regulations. There is no area limit, i.e., the 1000 m ² threshold does not apply.
Romania	The building regulation covers buildings more than 1000 m ² , meaning that all buildings larger than 1000 m ² must follow the rules in case of renovation.
Slovak Republic	The condition of 1000 m ² is not generally included into the Slovak regulation. Just in the case that a building has an area more than 1000 m ² the designer have the duty to work out the energy review (alternative and renewable sources).
Spain	It's the same as in EPBD. Only if you are retrofitting a building over 1000 m ² you must comply with energy efficiency requirements, if you are affecting over a 25 % of the building envelope. But any change on the thermal installation must comply with RITE.
Sweden	Applied on article 6 Sweden do not use the limit 1000 m ² , but we have the 1000 m ² limit when it comes to the demand on official buildings being certified (declared) article 7 and regarding the alternative energy investigation requirement according to article 5. In our building code we have some other area limits. When it comes to energy performance there is a demand in kWh/m ² and U-value in dwellings and non-residential buildings. When a building is smaller than 100 m ² or if you increase the building area with less than 100 m ² , you are allowed to use special demands with specified U-values for each building part and special demands on airtightness and heat retention. If the building is smaller than 60 m ² the demand on heat retention can be ignored.
Switzerland	No requirements according to this very limit. Energy saving rules applies to all buildings. However, there is no mandatory certification now (in 2008).
UK England & Wales	There are additional requirements at this threshold – for pressure testing, provision of metering, commissioning reports etc.

5.2 Planned national regulation regarding the implementation of the 1000 m² limit including any tighter requirements

The plans for future tightening of the 1000 m² threshold falls into two groups, with and without actual plans for tightening. The group of MS, which answered "no actual plans for tightening" of the 1000 m² threshold (86 %), includes two sub-groups:

- MS that already have as tight rules as practically feasible
- MS that have implemented the rules recently and consequently have not gained experience to support any tightening.

Finland, Estonia, and Latvia have plans for a tightening of 1000 m² threshold. In Estonia though, the 1000 m² threshold will not be changed, but a 33 % tightening of the energy requirements for major renovation of large buildings is foreseen. In Finland and Latvia lowering of the 1000 m² threshold is expected, but no final decision has been made yet.

Table 8. Planned tightening of the 1000 m² threshold. The green column shows the summary for EU27. The yellow column includes Croatia, Norway, and Switzerland.

	AT	BE	BG	CY	CZ	DK	EE	FI	FR	DE	GR	HU	IE	IT	LV	LT	LU	MT	NL	PL	PT	RO	SK	SI	EP	SE	UK	HR	NO	CH			
	Austria	Belgium (Flanders)	Bulgaria	Cyprus	Czech Republic	Denmark	Estonia	Finland	France	Germany	Greece	Hungary	Ireland	Italy	Latvia	Lithuania	Luxembourg	Malta	Netherlands	Poland	Portugal	Romania	Slovak Republic	Slovenia	Spain	Sweden	UK (England&Wales)	Croatia	Norway	Switzerland	EU27	EU27+3	
2.2	Planned national regulation regarding the implementation of the 1000 m² limit including any tighter requirements																																
Tightening planned							x	x							x																3	3	
No additional tightening	x	x		x	x	x			x	x	x	x		x		x			x	x	x	x	x		x	x	x	x	x	x	19	22	

Table 9. Question: Describe your planned national regulation regarding the implementation of the 1000 m² limit including any tighter requirements. Grey markings indicate that the answer may not be focussed on actual question.

Country	Answer
Austria	Transposition is not completed yet.
Belgium, Flemish region	Tightening of this will be studied in future, not yet foreseen.
Croatia	The limit in future regulation is not determined yet.
Cyprus	The national regulation provides no tighter requirements than those described in the Directive.
Czech Republic	The reconstructions shall be executed on the base of results of energy audit in compliance of the Act. No. 406/2006 Coll. on Energy and the Decree No. 213/2001 Coll. on Energy Audits. The measures are optimal from the energy, ecological and economical point of view.
Denmark	The requirements in DK regarding this are already as tight as possible (no m ² limit). The planned regulation will therefore be as tight as the existing one concerning the m ² rules, but more individual, profitable measures can be applied to the existing list.
Estonia	There is a plan to adopt 33 % tougher energy performance requirements for buildings over 1000 m ² undergoing major renovation.
Finland	We are working with new energy requirements for renovation and there has been discussion about a tighter area limit than 1000 m ² but any decision has not been made yet.
France	-
Germany	The requirements in Germany regarding this are already as tight as possible (not m ² limit). The planned regulation will therefore be as tight as the existing one.
Greece	-
Hungary	The requirements are the same as in the case of new buildings.
Italy	None.
Latvia	Cabinet of Ministers Regulations are in preparation phase now. Maybe it is possible that these energy efficiency minimum requirements will include some specific cases with tighter requirements.
Lithuania	None.
Norway	Our regulation is already more tight than what the directive goes for.
Netherlands	No specific changes in regulations are planned.
Poland	No tightening planned.
Portugal	In the Portuguese regulations, every building undergoing major renovation must comply with the new regulations. There is no area limit, i.e., the 1000 m ² threshold does not apply.
Romania	The planned regulation will change this requirement concerning the m ² rules, if the directive shall provide that.
Slovak Republic	Changes are not planed into the future.
Spain	No knowledge of any planned tighter requirements about the 1000 m ² buildings.
Sweden	Article 5, the same limit as the directive, We also have a law in Sweden requiring municipalities to have a energy plan for the municipality, stating which part of the municipality is suitable for different kinds of energy use, for example district heating.

	Regarding article 6 Sweden do not have a limit. Regarding article 7 Sweden have chosen the 1000 m ² limit we also chose according to the directive point three.
Switzerland	The Swiss government discusses the possibility of introducing a mandatory certification for all rented or sold buildings.
UK England & Wales	There are concerns that requirements for consequent improvements may reduce the total numbers of buildings refurbished.

5.3 Arguments based on which the level of limit was determined

In many MS a limit of 1000 m² excludes a major part of the building stock from being required to meet certain minimum energy performance levels when a major renovation is carried out. Other MS have a tradition for including all buildings in the legislation, no matter the size of the building. Additional building regulation requirements, like safety, fire or contraction etc) are valid for all building sizes, and it has thus been natural to implement energy requirements on the same scale.

One of the arguments for having an area limit lower than 1000 m² in order to comply with the minimum energy performance requirements in combination with a major renovation is that energy saving measures will most likely be cost effective in small buildings as well.

Table 10. Question: Describe the arguments based on which the level of limit was determined.

Country	Answer
Austria	-
Belgium, Flemish region	There was a history of setting requirements for all renovations, there was no discussion about not setting requirements any more for smaller renovations.
Cyprus	The absence of any similar building regulations in the past lead to the decision that at the beginning we should set limits not far from the market and construction industry practise.
Czech Republic	The reconstructions shall be executed on the base of results of energy audit in compliance of the Act. No. 406/2006 Coll. on Energy and the Decree No. 213/2001 Coll. on Energy Audits. The measures are optimal from the energy, ecological and economical point of view.
Denmark	DK has had building regulations for many years, and it was never an option to loosen the regulation as there has never been an area limit connected to renovations.
Estonia	The limit was chosen according to minimum requirement of the directive.
Finland	If we would take into use the 1000 m ² threshold, 40 % of the heating energy consumption of the building stock would be excluded. In order to reduce energy consumption it would be useful to give requirements for renovation of single family houses also.
France	The target of this regulation is all renovations, without limit of size or cost of the building. For major renovation, the limit is taken form the directive. In order to forecast every renovation, others case are in addition submitted to rules.
Germany	Germany has since the start of the "Wärmeschutzverordnung" in 1978 always considered all buildings besides really small building (< 100 m ² useful floor area). An increase up to 1000 m ² would have been a weakening of the energy decree. In the opposite the current version of the energy decree has decreased the limit down to 50 m ² for new building and for energy certificates of buildings. The renovation requirements however have no useful floor area threshold.
Greece	-
Hungary	Technically feasible, simple and unambiguous.

Italy	Internal technical and economic evaluations, referred to limits gradual adoption only.
Latvia	<p>No specific limits, just EPBD limit 1000 m² and 25 %.</p> <p>According to the "Energy Efficiency in Buildings Law" major renovation is described as total floor area is larger than 1000 m² and which total renovation expenses exceed 25% of building cadastral value or which renovation works apply to 25% of building construction volume.</p> <p>Cabinet of Ministers Regulations No.112 "General Construction Norms" published according to Construction Law Article 2 fourth part include 3 definitions: Reconstruction; Renovation; Restoration.</p>
Lithuania	Varies.
Norway	We decided to go for the small regime as we already had for all other kinds of requirements for renovations (fire, contraction-safety and so on). No new arguments.
Netherlands	The justification lies in the substantially enlarged energy saving potential by lowering the threshold. Besides, Dutch legislation using a threshold of 50 m ² was already in place. Therefore the Dutch government believes that lowering the 1000 m ² to a 50 m ² threshold is an effective approach to increase the impact of the directive. The threshold of 50 m ² is to exclude barns etc. where no improvement on the energy performance can be obtained.
Poland	So far decision on improvement of energy performance of building was entirely based on owner or manager opinion, but to obtain financial support for thermo-modernisation (1998) based of "Thermo-modernisation Act" (1998) a building that undergone the thermo-modernisation investment has to fulfil more strict conditions (better insulation parameters) than for new buildings.
Portugal	The rationale was that the requirements are cost effective for every building and, thus, there should be no exception. This was already in Portuguese Law since 1990 and it was simply kept in the updated regulations.
Romania	The actual regulation intended to respect the Directive prescriptions, but Romania has had never in anterior regulations an option to limit the area of buildings connected to renovations.
Slovak Republic	The limit was not used because of including the family houses for the energy certification and to prevent the cases to divide the houses on smaller parts.
Spain	EPBD transposition.
Sweden	<p>Article 5, the same limit as the directive, We also have a law in Sweden requiring municipalities to have a energy plan for the municipality, stating which part of the municipality is suitable for different kinds of energy use, for example district heating.</p> <p>Regarding article 6 Sweden do not have a limit.</p> <p>Regarding article 7 Sweden have chosen the 1000 m² limit we also chose according to the directive point three.</p>
Switzerland	-
UK	-
England & Wales	

5.4 Building stock data

This information was intended for estimating the energy saving potential in the MS if the building renovation thresholds were lowered. The answers however showed that only 2 of the MS (Greece and United Kingdom), which provided sufficient information, only have partial coverage of the building stock. The rest of the MS, which provided sufficient information, have 100 % coverage of the building stock due to no or very low area threshold. It is thus not possible in this study to estimate the energy saving potential in EU by reducing the 1000 m² threshold.

In most MS the requested information is not available, and in other MS information is only available for part of the prescribed building types. Thus it is

difficult to give an accurate picture of the building stock in the MS. It is hoped however that implementation of a general energy certification scheme in the MS, as defined in the EPBD, will lead to availability of this kind of information in all MS.

Table 11. Share of building stock affected by the EPBD 1000 m² threshold and the energy consumption in different building types. Numbers are based on information from Austria, Germany, Denmark, France, Greece, Hungary, Latvia, Netherlands, Poland, Romania, Slovak Republic, United Kingdom (England & Wales), and Croatia.

Building type	Area limit for the different building types			Share of floor area covered by the m ² limit, for each building stock type covered by your area limit			Total floor area of building type million m ²	Heating (including electricity for heating)			Electricity (excluding heating)		
	Min	Avg	Max	Min	Avg	Max		Min	Avg	Max	Min	Avg	Max
Single family houses of different types	0	226	1000	0	88.9	100	3651367	134	187.9	260	27	34.3	45
Apartment blocks	0	226	1000	55	95.0	100	1891709	95	160.2	260	27	35.3	45
Offices	0	254	1000	45	88.5	100	430159	95	133.1	202.3	25	75.8	122
Education buildings	0	254	1000	60	95.0	100	165106	66	126.0	163.8	16	19.3	26
Hospitals	0	781	5000	75	96.9	100	101798	153	4726.4	22800	68	1332.3	5100
Hotels and restaurants	0	254	1000	55	94.4	100	79230	135	185.6	222	75	79.5	84
Sports facilities	0	254	1000	0	78.1	100	5556	105	143.8	184.4	40	50.5	61
Wholesale and retail trade services buildings	0	254	1000	33	88.1	100	103813	74	120.0	168.9	43	82.3	126
Other types of energy consuming buildings	0	290	1000	0	75.0	100	251773						
Industry	0	500	1000	70	85.0	100	71839						
Buildings for culture, free time and education	0	500	1000	70	85.0	100	15781						
Total building stock		344.6			88.2		7074176		722.9			213.7	

The table below shows the comments given by the MS with respect to the requested information on the European building stock.

Table 12. Comments given to the question: Indicate the share of the building stock and average final (final energy, delivered to the buildings) energy use that needs to follow your national area limit, if any. If possible, make a break-down in different building types and/or give an estimate for total building stock.

Country	Answers
Austria	Total floor area: [number of buildings] – source: Statistik Austria Heating: Not possible to find detailed information about heating in conclusion to building types
Belgium, Flemish region	It is not possible to make this table. 1 % of the building stock is renovated each year, they all have to follow the requirements.
Croatia	A residential building for which heating is planned at a temperature of 18 °C or over the yearly required heating per unit area of the usable building surface area Q _h " [kWh/(m ² •a)], depending on the building shape factor f ₀ , does not exceed the following values: - For f ₀ ≤ 0.20 Q _h " = 51.31 kWh/(m ² •a) - For 0.20 < f ₀ < 1.05 Q _h " = (41.03 + 51.41 • f ₀) kWh/(m ² •a) - For f ₀ ≥ 1.05 Q _h " = 95.01 kWh/(m ² •a). A non-residential building for which heating is planned at a temperature of 18 °C or over, must be designed and constructed in such a way that the yearly required heating per unit area of the usable building surface area Q _h ' [kWh/(m ² •a)], depending on the building shape factor f ₀ , does not exceed the following values: - For f ₀ ≤ 0.20 Q _h ' = 16.42 kWh/(m ² •a) - For 0.20 < f ₀ < 1.05 Q _h ' = (13.13 + 16.45 • f ₀) kWh/(m ² •a) - For f ₀ ≥ 1.05 Q _h ' = 30.40 kWh/(m ² •a).
Cyprus	There no data concerning the building stock yet.
Czech Republic	We are able to specify the data only for blocks of flats. Other types of public buildings with the energy consumption above 700 GJ/year were audited. However, the energy audits have not been analysed.
Denmark	As there are no limits on areas, it does not reduce the share of the building stock. So it stays approx. 100 % for all building types and in total. The numbers are estimated average values for the existing building stock, lessons learnt and knowledge acquired from the certification schemes (since 1996).
Estonia	-
Finland	-

France	Consumptions given for heating and hot water, in kWh primary energy/m ² for residential, in kWh final energy/m ² .																																			
Germany	<p>There is no limit concerning the area, so there is no reduction of the building stock. The table filled with the number of buildings and the floor areas covered shows 100 % of the German buildings that fit into the different building types. All of them have to meet the requirements if they are renovated. They are however not all renovated at the same time.</p> <p>Source of the building stock data: IEE ENPER-EXIST, German contributions to WP3.</p>																																			
Greece	The share in the second column is an estimate. The energy consumption values are derived through a number of studies performed by CRES and others.																																			
Hungary	-																																			
Italy	<p>Not applicable to Italian situation.</p> <p>In our regulation, the primary energy need limit values for new buildings only, expressed in kWh/m² year, are based on the S/V ratio of the buildings and are differentiated according to the climatic zones (characterised by GG, gradi -giorno, "Degrees-Day"), as shown in the table.</p> <table><tr><td>GG</td><td>600</td><td>601-900</td><td>901-1400</td><td>1401-2100</td><td>2101-3000</td><td>> 3000</td></tr><tr><td>S/V</td><td colspan="6">Climate zone</td></tr><tr><td></td><td>A</td><td>B</td><td>C</td><td>D</td><td>E</td><td>F</td></tr><tr><td>< 0.2</td><td>10</td><td>10-15</td><td>15-25</td><td>25-40</td><td>40-55</td><td>55</td></tr><tr><td>> 0.9</td><td>45</td><td>45-60</td><td>60-85</td><td>85-110</td><td>110-145</td><td>145</td></tr></table>	GG	600	601-900	901-1400	1401-2100	2101-3000	> 3000	S/V	Climate zone							A	B	C	D	E	F	< 0.2	10	10-15	15-25	25-40	40-55	55	> 0.9	45	45-60	60-85	85-110	110-145	145
GG	600	601-900	901-1400	1401-2100	2101-3000	> 3000																														
S/V	Climate zone																																			
	A	B	C	D	E	F																														
< 0.2	10	10-15	15-25	25-40	40-55	55																														
> 0.9	45	45-60	60-85	85-110	110-145	145																														
Latvia	Official statistical data are available from 1980-2007; no data before 1980; assumption is that this figure could be at least a half higher because before 1980 high amount of building stock was built.																																			
Lithuania	No consolidated data.																																			
Norway	We have no good statistic in this field.																																			
Netherlands	<p>Monuments, religious buildings and detached buildings smaller than 50 m².</p> <p>Of the dwellings 80 % consists of single family houses and 20 % of blocks of flats.</p>																																			
Poland	The requirements are for energy demand and are expressed in kWh/m ³ , and depends on shape factor (here the recalculation to m ² has been done). They will be changed in a new regulation. No requirements for electricity consumption. Other types of buildings are subject of component requirements.																																			
Portugal	Data not available to fill in this table.																																			
Romania	All the data is not directly available, but can be prepared.																																			
Slovak Republic	-																																			
Spain	There are no statistical data in the building sector of Spain like those you are asking about. IDAE has got its own estimation (for National energy plans) but those are not public statistical data.																																			
Sweden	-																																			
Switzerland	The information I found at the national office for statistics includes only the number of buildings of various types. This does not allow me to fill in this table in such details. A national enquiry on this issue is now running.																																			
UK England & Wales	More information probably available but not in the timescale requested. Benchmarks relate to older buildings.																																			

6 Other renovation-specific issues

A number of general questions related to building renovation were asked in the questionnaire. Even though the questionnaire clearly focussed on energy rules related to building renovation, many answers were given with respect to the energy rules for new buildings. The answers might thus be ambiguous and the extracts of the findings partly based on the authors' experience.

6.1 Energy performance requirements for renovated buildings

Seventeen of the MS answering the questionnaire have requirements for retrofitting of individual parts of the building envelope or the energy systems of the building. These requirements are easy to comply with compared with requirements for the overall energy performance of the renovated building. In 9 MS there are energy performance requirements for the entire renovated building, while 3 MS have energy performance requirements solely for the renovated zone. In 10 MS, building or zone requirements are combined with requirements for individual components.

When dealing with total renovations of an existing building or with changed use of the building, some MS have the same requirements for renovated buildings as for new buildings. Other MS have requirements for building components, but no requirements for the total energy performance of the renovated building.

The requirement for implementing mandatory energy improvements for individual components can be neglected in some MS, if the energy saving measure is calculated not to be cost effective.

The energy performance calculation will in most MS be performed for the whole building even though only a section of the building is renovated. In a few MS it is possible to perform the calculation solely for renovated section.

Table 13. Performance requirements for renovated buildings in MS. The green column shows the summary for EU27. The yellow column includes Croatia, Norway, and Switzerland.

	AT	BE	BG	CY	CZ	DK	EE	FI	FR	DE	GR	HU	IE	IT	LV	LT	LU	MT	NL	PL	PT	RO	SK	SI	EP	SE	UK	HR	NO	CH			
	Austria	Belgium (Flanders)	Bulgaria	Cyprus	Czech Republic	Denmark	Estonia	Finland	France	Germany	Greece	Hungary	Ireland	Italy	Latvia	Lithuania	Luxembourg	Malta	Netherlands	Poland	Portugal	Romania	Slovak Republic	Slovenia	Spain	Sweden	UK (England&Wales)	Croatia	Norway	Switzerland	EU27	EU27+3	
3.1	Definition of energy performance requirements for renovated buildings																																
Building performance	x				x		x		x	x									x		x	x							x	x	9	1	
Zone performance												x													x	x			x		3	4	
Component requirement	x	x			x	x			x	x	x			x	x	x			x	x	x	x	x			x	x				17	1	
None				x				x																							2		

Table 14. Question: How are energy performance requirements for renovated buildings defined? For the renovated systems or components (e.g. windows, boiler, roof, ventilation system, etc.); for the renovated zone of the building (e.g. a wing of the building); or for the building as a whole?

Country	Answer
Austria	Individual parts of the building envelope and systems in the buildings have to fulfil defined minimum requirements in the renovated building. In addition, there are minimum requirements regarding the heating energy demand.
Belgium, Flemish region	Some cases (large new parts, "stripping" of buildings > 3000 m³): same requirements as for new buildings: U/R-value, K-level, E-level, ventilation and for residential buildings also summer overheating other cases: only U/R-values for new and renovated parts of the building + ventilation.

Croatia	Individual parts of the building envelope have to fulfil the requirements. In case of designing the reconstruction or the alteration of an existing building which is heated at a temperature over 12 °C, and when as a result of the construction intervention the volume of the heated section of the building increases by at least 30 m ³ , or when the design determined temperature increases in the section of the existing building of the area exceeding 30 m ³ , then the requirements of this Regulation relating to the new buildings shall apply to these parts of the existing building.
Cyprus	To be decided.
Czech Republic	<p>Individual parts of the building envelope and systems in the buildings have to fulfil minimum requirements given in the National Technical Standard (Thermal Protection of Buildings) and other relevant technical standards (boiler, etc.) and decrees. It is, of course, also favourable to meet minimum performance criteria for the whole building (if it is not possible to achieve the minimum performance criteria, it has to be in the case of buildings with floor area over 1000 m² proved by the energy audit).</p> <p>Individual measures are U values of individual building elements, internal temperature at the internal leaf of envelope structures (which has to be higher than dew point temperature), limits for allowed condensation within structures, thermal stability of the room in summer and in winter, minimum efficiency of boilers, etc.</p>
Denmark	<p>Individual parts of the building envelope and systems in the buildings have to fulfil certain minimum requirements in the renovated building. Thus there is no overall performance requirement for the renovated building, but only for the individual components and systems.</p> <p>There are individual, profitable measures, which have to fulfil the requirements, regardless of the size of the renovation. Individual measures are insulation of external walls when changing rain shield, insulation of attic and roof when changing roof, change of boilers and change of heat supply. Furthermore the heating and ventilation systems have requirements that have to be fulfilled.</p> <p>When exceeding the 25 % limit, all profitable energy saving measures have to be carried through - including the parts of building and systems that was not planned to be renovated.</p>
Estonia	Minimum energy performance requirements for all building types are expressed as an energy performance number. The energy performance number is calculated for the building on its standardised use. Data for the standardised use include a description of load profiles and indoor climate. The energy performance number depends on energy or fuel delivered to cover the energy demand in building – each source has an individual weighting factor (e.g. district heating 0.9, natural gas 1, and electricity 1.5) that takes into account environmental impact of particular source.
Finland	We have no special definition of requirements for renovated buildings.
France	<p>For large renovations (25 % of the building value and building more than 1000 m²) if the building has been finished after 1948: the requirement is defined for the whole building.</p> <p>In others cases, the requirements are defined for the system or component changed or installed.</p>
Germany	Both. For renovations at single components or systems there are specific requirements for these components/systems. Alternatively the building owner (or issuer) can choose to prove that the primary energy demand requirements for retrofitted buildings are met (140 % of the demand for a comparable new building).
Greece	Individual parts of the building envelope and systems in the buildings have to fulfil certain minimum requirements in the renovated building.
Hungary	The specific primary energy consumption in kWh/m ² a requirement must comply with the requirement, either for the renovated zone or for the whole building - option can be selected by the designer.
Italy	Energy performance requirements are based on single components, with the same limits as the new buildings.
Latvia	Building envelope components.

Lithuania	Not less than efficiency class D. Individual parts of the building envelope and systems in the buildings have to fulfil certain minimum requirements depending on renovation.
Norway	You can choose - either to look at the whole building or only the renovated zone.
Netherlands	The same as the requirements for new buildings.
Poland	For the renovated systems or components.
Portugal	For the building as a whole, as well as minimum insulation levels for the building envelope and minimum requirements for shading of windows.
Romania	The actual energy performance of a building is all the time compared with a "reference building" which is a virtual building having the same geometry as the actual building but the energy performance as a new one - concerning individual parts of the building envelope and systems (indirectly, after renovations the building have to fulfil certain minimum requirements for the individual components and systems, and also an overall performance requirement).
Slovak Republic	U-value for building structures as, walls, roofs, windows, etc, hygienic criteria (min. surface temperature, air change rate, energy criteria.
Spain	For the renovated zone of the building.
Sweden	Depending on the size of the renovation, the part included in the renovation has to fulfil the requirements in the building code for new buildings, but if the change of the building is of the climate shell one should aim for the qualities in the building code. If there are obstacles such as cultural values or risk of losing other qualities of the building, the aim could be set lower than the building code for new buildings. If the renovation is larger, the demands could be applied to other parts of the building as well.
Switzerland	The energy saving rules applies to both new and renovated buildings. However, the limits for renovated are about 50 % weaker.
UK England & Wales	Minimum performance requirements for replacement elements (irrespective of whether the work counts as major renovation): insulation, boiler efficiency, air-conditioning efficiency, specific fan power, lighting system performance. In principle, major renovations should meet the same standards as new buildings - but subject to the technical, functionally and economically feasible caveat.

6.2 System and component requirements

In most MS, there are individual requirements for the building components or systems in the renovated building. In some MS though, there is a requirement for the energy performance of the whole building.

In Germany and in Switzerland for example, there is freedom to choose between compliance with component requirements and building energy performance requirements. And in Hungary an energy performance indicator must always be calculated, either for the renovated zone or for the whole building. Spain has component requirements, but moreover there are requirements for condensation limits for the building envelope and airtightness requirements for windows and doors. As the only MS, United Kingdom (England & Wales) has requirements for CO₂ emissions in conjunction with major renovations supplemented with requirements for components.

Table 15. Question: How are the system or component requirements defined? Are they direct component requirements, e.g. U-values or efficiencies or requirements to the total energy consumption based in final, primary or CO₂?

Country	Answer
Austria	See above! Information has to be given on the final energy demand; information on primary energy demand and CO ₂ -emission is voluntary. The efficiency scale (A++ to G) only refers to heating energy demand.
Belgium, Flemish region	Component requirements.
Croatia	U value is used in construction section.

Cyprus	To be decided.
Czech Republic	U values and efficiencies are being used. In the case of buildings over 1000 m ² has to be taken into account also the total energy consumption of the renovated building.
Denmark	U-values and efficiencies are used, not the total energy consumption of the renovated building.
Estonia	-
Finland	-
France	<p>For large renovations (25 % of the building value and building more than 1000 m²), if the building has been finished after 1948: the requirement aims at limiting the energy consumption in primary of the whole building. In addition, some requirement for the components is defined (U-values).</p> <p>In others cases, only requirements on changed or installed components are defined and the energy consumption of the building is not calculated. Energy performance levels are required for insulation (U-values), heating, cooling, hot water production, ventilation and lighting efficiency.</p>
Germany	They are defined for the renovated systems or components (maximum U-values, building systems with CE-signs only, in case of boilers low temperature and condensing boilers only and controls dependent on time or exterior temperature or similar). Alternatively there is the possibility to meet the primary energy demand requirement for the whole building (140 % of the demand for a comparable new building).
Greece	Direct component requirements and efficiencies are being used, not the total energy consumption of the renovated building.
Hungary	The specific primer energy consumption in kWh/m ² a requirement must comply with the requirement, either for the renovated zone or for the whole building - option can be selected by the designer. The requirement cannot be met if the components are of low quality.
Italy	U-values.
Latvia	U-values.
Lithuania	Requirements to total energy consumption.
Norway	The requirement is set as an upper limit for the energy demand.
Netherlands	There is one EPC, based on the performance of the combination of all the components. The EPC is a figure without a dimension.
Poland	Direct requirements and/or energy use versus reference building energy use.
Portugal	Maximum U-values apply, as well as maximum allowed values for heating needs, cooling needs, production of hot water needs, as well as maximum primary energy needs for the building as a whole.
Romania	<p>For existing buildings to be renovated there are not imposed values but the overall performance (kWh/m²) must go to that of the "reference building" and indirectly to U values of individual components of a new building which are established to be compulsory for every type of building.</p> <p>For the energy certificate of a building are to be calculated the total energy consumption, primary energy and CO₂.</p>
Slovak Republic	There is given the requirement for the components and for the building based on delivered energy.
Spain	As for the new buildings, there is a U limit value and a Solar factor value to comply with. Moreover there is a condensation limit for the building envelope and a permeability to air limit for windows and doors.
Sweden	In general the requirements are stated as total energy consumption based on final energy use and U-value, but if the area of the building or building part falls below the limit 100 m ² , alternative requirements can be used stating direct component requirements for different building parts.

Switzerland	The owner has the choice between two ways of fulfilling the requirements for heating: either applying minimum U-values to all envelope components (including thermal bridges) or calculating the energy needs according to EN 13790 and showing that a given limit (MJ/m ² floor area) is not over passed. The limits for envelope components are more stringent than the general limit.
UK	In principle CO ₂ (subject to the caveats). For replacement elements by appropriate
England & Wales	performance measure – U-value, efficiency, SFP etc.

6.3 CE labelling or national labelling of components or systems

Most of the MS, which answered (64 %), have an accreditation system that is linked to the CE labelling system for building components and building systems.

For some products a CE labelling does not exist. In Denmark, for instance, the testing of energy properties for these products has to comply with ISO and EN standards.

In France, where CE labelling is not available, national certifications can be used to justify the performance. Otherwise, conventional values of performance are defined in the regulation.

Table 16. Compliance in national requirements with the CE labelling of components or systems in MS. The green column shows the summary for EU27. The yellow column includes Croatia, Norway, and Switzerland.

	AT	BE	BG	CY	CZ	DK	EE	FI	FR	DE	GR	HU	IE	IT	LV	LT	LU	MT	NL	PL	PT	RO	SK	SI	EP	SE	UK	HR	NO	CH		
	Austria	Belgium (Flanders)	Bulgaria	Cyprus	Czech Republic	Denmark	Estonia	Finland	France	Germany	Greece	Hungary	Ireland	Italy	Latvia	Lithuania	Luxembourg	Malta	Netherlands	Poland	Portugal	Romania	Slovak Republic	Slovenia	Spain	Sweden	UK (England&Wales)	Croatia	Norway	Switzerland	EU27	EU27+3
3.3	Are the national requirements based on the CE labelling of the component or system, if it exists for the component or system?																															
CE	x					x			x	x	x				x	x			x	x	x	x	x		x	x				14	14	
National, overruling CE					x									x						x	x	x						x			2	3
None	x		x				x	x				x															x		x	x	6	8

Table 17. Question: Are the national requirements based on the CE labelling of the component or system, if it exists for the component or system?

Country	Answer
Austria	In Austria, the national requirements on the CE labelling refer to components like building components and building materials.
Belgium Flemish region	-
Croatia	<p>Prior to signing the agreement regulating the area of construction products, between the Republic of Croatia and the European Union, the marking of construction products, which comply with Croatian standards and have been adopted in accordance with the principles of European legislation harmonisation, shall be performed pursuant to the provisions of a special regulation regulating this matter.</p> <p>Technical characteristics of the construction products intended for incorporation into buildings and aimed at energy economy and heat retention depending on the type of the construction product must meet the general and special requirements essential for their end use in buildings and must be specified in accordance with HRN EN standards. The types of construction products are as follows:</p> <p>Thermal insulating construction products, connecting systems for external thermal insulation composite systems (ETICS) based on the expanding polystyrene and on mineral wool and walls and the masonry products.</p>
Cyprus	To be decided but probably the CE labelling of the component or system will be taken into account, if it exists.
Czech Republic	In compliance with 106/89/EHS or with 205/32/ES.

Denmark	In Denmark the fulfilment of the requirement is based on CE certified components and systems when possible. This is only possible for insulation materials, boilers and soon windows. For other products it will be testing of the energy properties according to the ISO and EN standards, which has to be complied with. For other products the testing of the energy properties should comply with ISO and EN standards.
Estonia	No national requirements.
Finland	-
France	Requirement is based on CE labelling of components and systems when possible (insulation, boilers efficiency) When CE labelling is not available, national certifications can be used to justify the performance. Otherwise, conventional values of performance are defined in the regulation.
Germany	Yes. The German energy decree requires using building systems (HVAC systems) with CE signs only.
Greece	Yes if it exists.
Hungary	No.
Italy	No, internal evaluations.
Latvia	Lighting and construction materials.
Lithuania	Yes.
Norway	-
Netherlands	Yes.
Poland	Yes, it does exist CE labelling system for components.
Portugal	Every construction product must have the CE marking.
Romania	In Romania there is not a system of labelling of the components but it is necessary that component systems to use materials and systems which are CE certified components and systems or products tested concerning the energy properties following ISO and EN standards which have to be followed.
Slovak Republic	The national requirements are based on the CE labelling of component or system.
Spain	The thermal characterisation of the building materials is included on an official "Materials catalogue". All those were taken of the CE labelling when it is possible or (most of them) directly from the material manufacturers.
Sweden	No, but if CE label exists it is the only way accepted.
Switzerland	A CE labelling system for buildings, based on EN 15217 and EN 15603, will be very soon published by the SIA (in charge of drafting national building standards) but will be applied on a voluntary basis for the time being.
UK England & Wales	Not explicitly, though the limits on use of non-marked products obviously apply.

6.4 Other energy requirements that must be complied with

Generally there are requirements to the maximum heat transfer coefficient allowed for different building elements. These maximum values are set mainly to prevent the risk of condensation on the internal side of the constructions rather than for energy reasons. The overall energy performance of the building will normally ensure a higher standard than required in the maximum heat transmittance coefficient.

There are also considerations regarding thermal bridges, and the requirements for these are also related to a wish to prevent surface condensation.

Portugal and Sweden apply the same energy performance requirements for buildings subjected to major renovation as for new buildings. In Sweden though, the energy requirements for new buildings should only be complied with if cultural values or other qualities are not at risk.

In Denmark there are special energy requirements (less strict) for renovating small windows or windows with many division bars due to the preservation of architectural values.

Table 18. Question: Describe other energy requirements that have to be fulfilled when undertaking renovation of buildings. Grey markings indicated that the answer may seem ambiguous. .

Country	Answer
Austria	A minimum heating energy demand has to be achieved. In addition to the EPBD there is a voluntary building standard taking additional criteria into account, such as user comfort, water consumption, renewable energy supply (klima:aktiv building standard).
Belgium Flemish region	-
Croatia	There is minimum thermal resistance defined for different type of building components, overheating of building areas due to the effects of solar radiation during summer should be prevented by using appropriate technical solutions. Buildings heated at a temperature over 12 °C must be designed and constructed in such a way that the impact of the thermal bridge on the yearly heating required shall be reduced to a minimum.
Cyprus	To be decided.
Czech Republic	There are minimum U-values defined for different types of building components and also different efficiency of systems. The global indicator – delivered energy – has to be met. Furthermore buildings shall achieve a healthy indoor climate. Thermal bridging should be avoided in external construction elements because of the risk of condensation.
Denmark	There are minimum thermal resistances defined for different types of building components and also different efficiency of systems. These values are based on moisture and mould prevention. Furthermore buildings should achieve a healthy indoor climate. Thermal bridging should be avoided in external construction elements including windows and doors due to the risk of condensation. There are special energy requirements (less strict) when renovating windows with small transparent fields due to preservation of architectural values.
Estonia	Maximum indoor summer temperatures should be checked for the room having the most problematic location in the building (with a lot of heat gain from the sun).
Finland	-
France	For large renovations, a level of comfort in summer is required without cooling, in order to avoid the use cooling systems.
Germany	Building surface components and building system components must not be changed in a way that does decrease the energy efficiency quality of the building. There is minimum thermal resistance coefficients defined for different types of building component in the German standard DIN V 4108-2 table 1. These values are based on moisture and mould prevention. These requirements have to be met when there are changes at the building envelope elements. There are also requirements for component joints to limit the thermal bridge effects.
Greece	Minimum thermal resistances defined for different types of building components and also different efficiency of systems. Thermal bridges are also considered.
Hungary	The specific primer energy consumption in kWh/m ² a requirement must comply with the requirement, either for the renovated zone or for the whole building – option can be selected by the designer. The requirement cannot be met if the components are of low quality.
Italy	Boiler efficiency limits.
Latvia	Construction norms LBN 002-01.
Lithuania	-
Norway	-
Netherlands	All materials and products must have an approved label.

Poland	Insulation of distribution network, control valves in heating installations, circulation in domestic hot water installations, also on pipes leading to outlets over 3 dm ³ /min, obligatory heat recovery for ventilation units over 10000 m ³ /h, exhaust air ventilation for garages and other compartments like storages etc. (these are the few rules but there are many others).
Portugal	The rules are precisely the same that apply to new buildings.
Romania	There are minimum thermal resistances defined for different types of building components and also different efficiency of systems. These values are based on moisture and mould prevention. Furthermore buildings shall achieve a healthy indoor climate. Thermal bridging should be avoided in external construction elements including window and doors because of the risk of condensation.
Slovak Republic	Requirement for component, surface temperature, air change rate, energy use and energy performance (total delivered energy) requirement, insulation of heat and hot water supplying system etc.
Spain	The energy efficiency requirements are included on the HE part of the building code (CTE). It's composed of HE1-Energy Demand requirements, HE2-Energy performance of thermal installations, HE3-Energy Efficiency of lighting installations, HE4-Minimum solar thermal contribution for DHW and HE5-Minimum solar photo-voltaic contribution.
Sweden	You have to aim for the requirements of the building code but if there are obstacles such as cultural values or risk of losing other qualities of the building are the aim could be set lower than the building code for new buildings.
Switzerland	According to regulations, there is now only a limit for heating needs.
UK	None.
England & Wales	

6.5 Compliance mechanisms

Most of the answers given seem to indicate that the control mechanisms are the same for new buildings and for renovation of existing buildings.

In some countries, e.g. Belgium, Czech Republic, and Denmark the local authorities carry out quality control of building renovations, but only in the case of renovation of large buildings. Compliance with the rules for small buildings is up to the building owner.

For new buildings however there is in general a control mechanism implemented in the MS. In most cases the control is carried out by an independent energy certifier, but the building owner is responsible for the fulfilment of the rules.

Table 19. Question: Describe compliance mechanisms and how rigorously they are applied, e.g. are there authorities checking their realisation on site? Grey markings indicate that the answer may seem ambiguous.

Country	Answer
Austria	There are no fines foreseen. The owner is obliged to present the energy certificate; in new construction it is obligatory for the building permit, in renovation owner and client may agree that they do not need the energy certificate. In this case, there is no mechanism to force owners to present the energy certificate. The case is different for the social housing sector where energy performance certificates have to be presented to receive social housing subsidies for renovation projects.
Belgium Flemish region	Yes, after the work a report must be send electronically to the government. Government does Q&A control on work of the rapporteurs and checks if everybody is sending the reports. When the requirements are not met, an administrative fine follows for the building owner.
Croatia	There is quality checking by authorities during final inspection of the building before issuing permit for use for all buildings with the area larger than 400 m ² .

Cyprus	<p>The architect or engineer supervising the construction of a building has to make sure that construction works conform to the Planning Permit in full, otherwise he shall apply for amendment which shall still comply with Building regulations.</p> <p>The compliance check and any on-site inspection are up to the local authorities and the Energy Service. Most of the compliance checks are performed randomly by the Energy Service along with cases due to a complaint being filed or where in the opinion of the local authority a check considered to be imperative.</p>
Czech Republic	For small constructions and renovations, which require only notification to the buildings office, it is up to the building owner to fulfil the requirements and there is no checking. For large constructions and renovations, which have to undergo proper building permission proceeding, the local authorities make quality checks and approvals before building being put into operation.
Denmark	For small buildings it is up to the building owner to fulfil the requirements and there is no checking. For large buildings the local authorities make quality checks and approvals.
Estonia	It is up to municipalities.
Finland	-
France	It is up to the building owner to fulfil the requirements and there is no checking on site.
Germany	<p>The German energy decree includes some definitions of regulatory offence, but they focus on the inspections, the exchange of building systems and the energy certificates. Retrofit besides the exchange of building systems is not mentioned. It is however written in paragraph 26 that the building owner is responsible for the compliance of the energy decree.</p> <p>In practice there is no real compliance procedure for the retrofitting of buildings.</p>
Greece	When a certificate is required then the energy auditors will check the compliance.
Hungary	Seldom.
Italy	Not in this phase.
Latvia	Exist at all phases - construction, putting into operational phase.
Lithuania	Authorities checking for compliance with design, certification expert for energy efficiency.
Norway	The control has been too weak so far, but will be increased in the near future.
Netherlands	The local government has the task to check the performances, described in the building permit, during construction.
Poland	<p>New buildings - designs are done by certified architect or engineer, and are presented to local authorities office where they undergone the formal checking, very seldom on detailed technical issues. After construction work is completed the Construction Supervisory Office (national administration) examines compliance with existing regulations.</p> <p>Existing buildings - in case of thermo-modernisation, the energy auditor (person who provides energy audit - no formal requirements) indicates scope of the investment according to which the designer elaborates the design. Afterwards, the procedures are the same as for new buildings, with the exemption that audit is verified by a third party to assess the choice of optimal investment scope.</p>
Portugal	The qualified experts that will issue the energy certificate can only issue it after checking full compliance with building regulations on site. Without the certificate, the use licence is not issued either.
Romania	The projects are verified by official experts for the main requirements and the local authorities make quality checks and approvals. In reality, it is necessary to strengthening the verification of the quality, to make it more rigorously.
Slovak Republic	-

Spain	In the building system in Spain (not only for the energy efficiency requirements) there are may control levels: before, during and after the building construction. Those depend on the local government and regional government, and involve the designer, the "building work controller" (in the name of the promoter), the insurance controller and the quality controller.
Sweden	In Sweden the compliance system is based on local authorities. The responsibility for compliance rests on the person who is in charge of ordering the building project (future proprietor). When the project is to begin the future proprietor applies for a building permit from the local authority. The local authority demands a control plan from the future proprietor, naming a special person assigned for controlling of project fulfilment of different requirements. Regarding energy issues, the local authority then can demand calculations of energy balance from the future proprietor and after two years of running the building, account for the operational rating. The authority can leave out the control of different requirements if the future proprietor is known to be a good builder but the proprietor is still responsible for fulfilment of the requirements. With the new system with energy declaration of buildings according to the EPBD the proprietor, or if the building is sold the new owner, has to account for the operational rating after two years of using the building.
Switzerland	The written and undersigned proof that the heating limit is fulfilled is part of the numerous papers required for obtaining a building permit. Officially, this document is binding, i.e. the building owner and the architect are engaged to build according to the provided drawings and calculations. Authorities check that these papers are filled and signed, and randomly check that the calculations look coherent. On site checking is performed only for buildings asking for a "MinergieP" label.
UK	Through standard building control procedures. The measures mentioned in Q2 are all England & Wales notifiable to building control.

6.5.1 Fines or similar penalties when requirements are not met

Like the previous question, it seems that this question has mainly been answered with respect to new buildings. The answers may therefore be ambiguous and consequently this section should be read with care before reaching any conclusions.

In most MS, which answered, a system of fines or other penalties has been implemented (64 %). In those MS with a system of fines, the fines are not entirely connected with the compliance with the energy requirements. Another kind of commonly used penalties is the postponement of permission to use the new or renovated building.

In some MS it will be possible for the building user to initiate proceedings against the owner and/or contractor if the rules on major renovations have not been complied with.

Table 20. Overview of fine or penalty systems in MS. The green column shows the summary for EU27. The yellow column includes Croatia, Norway, and Switzerland.

	AT	BE	BG	CY	CZ	DK	EE	FI	FR	DE	GR	HU	IE	IT	LV	LT	LU	MT	NL	PL	PT	RO	SK	SI	EP	SE	UK	HR	NO	CH		
	Austria	Belgium (Flanders)	Bulgaria	Cyprus	Czech Republic	Denmark	Estonia	Finland	France	Germany	Greece	Hungary	Ireland	Italy	Latvia	Lithuania	Luxembourg	Malta	Netherlands	Poland	Portugal	Romania	Slovak Republic	Slovenia	Spain	Sweden	UK (England&Wales)	Croatia	Norway	Switzerland	EU27	EU27+3
3.6	Are there fines or similar penalties when the requirements are not met?																															
Yes	x	x		x	x		x			x		x			x	x			x	x	x				x	x	x	x	x	x	14	17
No	x							x	x		x			x								x	x								8	8

Table 21. Question: Are there fines or similar penalties when requirements are not met?

Country	Answer
Austria	There is no check whether the predicted performance is met. There are no fines or similar penalties.
Belgium	Yes.
Flemish region	

Croatia	Yes.
Cyprus	A fine and/or penalty are inflicted on a person found guilty of not meeting the requirements.
Czech Republic	In compliance with the Act 406/2000 Coll. on energy management - the builder of owner of the building - 100 000 Kč (approx. 3 800 Euro).
Denmark	No fines are foreseen. If it is found that the rules have not been followed, the owner can claim (through legal proceedings) that the building is being updated according to the rules.
Estonia	Minimum energy performance requirements are like for other requirements for a building and penalties for incompliance are set by the Building Act.
Finland	No.
France	No.
Germany	For inspections, exchange of building systems and energy certificates it is stated that if they do not meet the requirements it would be a regulatory offense. In that case the building owner or issuer can be charged.
Greece	No.
Hungary	Exceptionally.
Italy	Indicated in the regulations, not yet applied in this phase.
Latvia	Law "Administrative penalties codex" foresees penalties from 70 to 7 000 EUR. Criminal Law foresees penalties from 10 000 EUR to 8 years in prison if building or part of building is collapsed and there is trading consequences.
Lithuania	Building will be not accepted for use.
Norway	The penalties may be in practise not as strong as for new buildings, even if this is the intention.
Netherlands	If the requirements are not met there will be no building permit. If a building is build and it does not fulfil the requirements the contractor has to change his construction or installation.
Poland	Yes, Construction Act states that violators of the law will be prosecuted and fined. In some cases it can result in loss of their professional rights.
Portugal	No fines, simply no permission to use, which is a quite tough penalty and implies major penalties.
Romania	Not yet, but it is intended to be introduced.
Slovak Republic	-
Spain	Yes, there is a "Consumer Protection" law involving the building sector.
Sweden	The use of the building can be stopped.
Switzerland	If something is not build according to the building permit (wrong dimensions or too weak thermal insulation, wrong window types, etc.), there is either an obligation to rebuilt according to the rules, or a fine. These errors are however not systematically looked for.
UK	In principle. These are under review at present.
England & Wales	

6.5.2 Efficiency and cost of compliance mechanisms

In general no information exists regarding efficiency and cost of the compliance mechanisms. The efficiency is though in few MS judged high as rules are normally followed in the MS.

Table 22. Question: Describe the efficiency and cost of the compliance mechanisms, if already studied.

Country	Answer
Austria	No rules are implemented yet.
Belgium Flemish region	Cost is not yet studied. Efficiency: first statistical analysis shows that the realised energy performance is lower than the requirements.
Croatia	-

Cyprus	Not studied yet.
Czech Republic	In the Czech Republic normally rules are followed.
Denmark	In Denmark rules are in general followed. There is no information about the compliance mechanism.
Estonia	-
Finland	-
France	-
Germany	The German people tend to follow rules and therefore also this legislation probably more strictly than other nations. Additionally the building companies such as plasterers, window installers etc. will tell the building owners that there are maximum U-values they have to meet. As there is no real compliance mechanisms there are no costs.
Greece	No information.
Hungary	No data available.
Italy	Not yet.
Latvia	In energy audit cases.
Lithuania	No.
Norway	-
Netherlands	No study available.
Poland	No studied, yet.
Portugal	No such study exists.
Romania	In Romania normally rules are followed. There is no information about the compliance mechanism.
Slovak Republic	-
Spain	It depends on the kind of fault.
Sweden	As the system is so new we have not had time to study it.
Switzerland	Global efficiency is rather good, since buildings built during this century use about 75 % less energy for heating than those built during the seventies. Cost is not studied, but making the calculations, and filling in the forms costs about € 1000 – to € 2000, depending on the complexity of the building.
UK	No information.
England & Wales	

6.6 Pros and cons of present regulations

Some answers describing pros and cons of the present regulations do not only focus on the overall aim of the questionnaire, which deals with building renovation and the thresholds stated by the EPBD and in national legislation.

Introduction of minimum requirements for the thermal performance of building components are considered an improvement in those MS, where rules related to renovation of buildings did not exist previously. Linking of subsidising schemes in Austria with energy improvements in conjunction with major renovations seems to be an efficient way to implement energy saving measures on a large scale.

The renovation thresholds (for area limits and major renovation) present a drawback in terms of covering the entire building stock for implementation of energy improvements in combination with major renovations. Another major drawback of the rules is that there is an additional cost, even though it will be paid back, for the building owner associated with a major renovation. This may encourage the building owner either to try to avoid the mandatory energy improvements or to undertake the renovation in smaller stages, which then comes below the limit for a major renovation.

Table 23. Question: Describe pros and cons regarding present regulations and how they can be improved. *Some of the answers listed in the table are not identified as being pro or con, but rather a statement related to the question. These answers are thus not marked with a "pro" or a "con", but just shown in plain text.*

Country	Answers
Austria	<p>Pro: Linking the energy performance certificate with the social housing subsidy scheme.</p> <p>Con: In Austria, there was no agreement on a harmonised approach for the transposition of the EPBD. We have 9 slightly different versions.</p>
Belgium Flemish region	<p>Pro/Con: Next to the U-R values, other requirements on component level could be useful for all renovations that do not have requirements like new buildings.</p>
Croatia	<p>The requirements shall apply to the houses with area less than 400 m².</p>
Cyprus	<p>Pro: Minimum requirements concerning U-values of shell components set for the first time.</p> <p>Con: Have not been evaluated yet.</p>
Czech Republic	<p>In the Czech Republic if a building is constructed or undergoes a renovation, it has to meet some minimum requirements (However, the execution of the Certificate is obligatory only in some cases laid down in the EPBD or by the Czech Act No. 406/2006 Coll., on Energy Management.).</p> <p>Con: Expensive and complicated for the building owner to fulfil the regulations and it may lead to increased cost and have a tendency of postponing renovations or making them in smaller stages (less than the 25 % limit).</p>
Denmark	<p>Lowering the limit is not possible in Denmark, but for other countries it will increase the impact of the EPBD.</p> <p>Pro: Introduction of a definition of a major renovation has been an improvement compared with previous rules.</p> <p>Con: Expensive and complicated for the building owner to fulfil the regulations and it may lead to increased cost and tend to postpone renovations or make them in smaller stages (less than the 25 % limit).</p> <p>The 25 % of the building value threshold may result in varying limits for when the "same" building in different regions of the same country undergoes a major renovation.</p>
Estonia	<p>Pro/Con: A lot of discretion can be used by municipalities and the effect of the system is very dependent on decisions taken by the municipalities.</p>
Finland	-
France	<p>Pro: First regulation on existing buildings.</p> <p>The level of requirement for large renovations is close to the level required for new building, which is ambitious.</p> <p>The level of requirements should be increased regularly.</p> <p>Con: The regulation lead to increased cost of renovation and could discourage building owners from performing renovation.</p> <p>The level of the requirements is not high enough.</p>
Germany	<p>Pro: U-value requirements are rather simple to understand and to meet. If the 140 % rule is chosen the same methodology is used for new buildings and for existing buildings. No 1000 m² rule: nobody has to check first if this rule has to be met. The 25 (20) % rule applied to area only (not to value of component or similar) is easier to check than value of component. The not existing compliance check procedure is causing no costs.</p> <p>Con: Compliance is not checked. The possibility of renovation of buildings without meeting the requirements can not be neglected.</p>
Greece	<p>There are no other existing regulations.</p>
Hungary	<p>Pro: Simple, unambiguous.</p> <p>Con: Buildings with floor area less than 1000 m² are not included.</p>
Italy	<p>Con: Lack of homogeneity among regional regulations and national regulations.</p>

Latvia	-
Lithuania	-
Norway	-
Netherlands	<p>Pro: improved quality of the building, innovation is stimulated, energy saved, cost reduction during use of the building; climate change.</p> <p>Con: market must accept stronger performances, contractors must apply new technologies, not familiar for them; no experience with new concepts; result complaints.</p>
Poland	<p>Pro/Con: Complex and demanding, however they give a chance towards harmonisation of energy approaches. And because they are supported by the European aspect, it can help in pushing national regulation in the common direction.</p>
Portugal	<p>There is still little experience, as the first buildings under these new regulations are still under construction. By 2009, data will become more significant.</p>
Romania	<p>Pro: Lowering the limits will increase the impact of the EPBD.</p> <p>Changing the definition of a major renovation must be an improvement compared to previous rules.</p> <p>Con: Expensive and complicated for the building owner to fulfil the regulations and it may lead to increased cost and have a tendency of postponing renovations or making them in smaller stages (less than the 25 % limit).</p>
Slovak Republic	-
Spain	<p>Pro: This new way of thinking is rewarding good designers in an objective manner. Now I do not have to prove that my building is good: there is a building certificate that demonstrates that it is a good building.</p> <p>For what about the Building Code or the Thermal Regulations itself there were different rules since 1974. So on it's not a new regulation but a new way to comply with.</p> <p>Con: New building Code has changed the way of thinking of building designers. So on it is a slow adaptation process.</p>
Sweden	<p>Within the building code the regulating authorities can not tell the building owner to make controls, this is up to the local authority. But with the new law in energy declaration of buildings the building owner still has to account for the energy use within the declaration, so the local authority has nothing to gain in not telling the building owner to account for the operational rating.</p>
Switzerland	<p>Con: The present regulations address heating only. They should be improved by first addressing all energy uses in the building, and by certificating all (new and existing) buildings.</p>
UK England & Wales	<p>Pro: Except for major renovation in the sense of complete re-cladding, elemental limits are to be preferred as being simpler to administer.</p>

6.6.1 Lessons learned regarding present regulations

In most MS the regulations are relatively new and consequently not many lessons learned at the present time. There are though a tendency to acknowledge that the rules should be as simple as possible to ease a smooth operation and acceptance.

The minimum requirements to the building components or systems being renovated are easier to administer and understand than the requirements to overall energy performance indicators. In some MS the rather vague terms "technically, functionally and economically feasible" have been transferred to practice by formulating direct requirements to components and systems. Further, it is up to the building owner to prove that a measure is not feasible under given conditions.

Many MS wish to eliminate the 1000 m² threshold to cover the entire building stock in case of major renovations.

Table 24. Question: Describe lessons learned regarding present regulations.

Country	Answer
Austria	It is difficult to execute conclusions, because the building sector is the responsibility of the provinces.
Belgium Flemish region	-
Croatia	-
Cyprus	Not applicable.
Czech Republic	Increase of the indoor quality of building. The renovation of buildings changes the moral and market price of building stock.
Denmark	<p>Minimum requirements for individual components are easier to manage than the 25 % rules.</p> <p>Compliance mechanism can be improved to ensure that rules are being followed.</p> <p>The list of requirements for single retrofitting measures in the Building Regulation could be extended as this seems to be a good and easy way of improving the energy performance of the existing building stock.</p>
Estonia	There has not been any investigation if the minimum energy performance requirements are applied in practice, as they were adopted quite recently (Jan 2008).
Finland	-
France	The regulation started to be applied in November 2007. It is too early to know how it is known and applied by professionals.
Germany	<p>The 1000 m² rule was never applied and is according to our experience also not necessary.</p> <p>The 25 % rule was never used in Germany. Instead we have a lower 20 % rule and this also working without problems.</p> <p>Studies have proven that the defined requirements in the energy decree (U-values etc.) are economically feasible within about half the life time of most measures. That is the most important point to the German building associations for accepting the requirements.</p> <p>By defining maximum U-values for retrofitted building components or having the 140 % rule for the primary energy demand of the retrofitted building compared to new building standard the rather weak definitions of "technically, functionally and economically feasible" was transferred to practice. It has to be proven by the building owner that the required measures are not feasible, only then they do not have to be implemented.</p> <p>The compliance mechanisms have to be improved.</p> <p>The required retrofitting measures should be extended (not only old boilers and not yet insulated, but not workable but reachable ceilings to the attic). The upcoming energy decree foresees additional obligations.</p>
Greece	-
Hungary	Due to the delay of implementation there is no experience.
Italy	Too early.
Latvia	-
Lithuania	Too less of experiences.
Norway	-
Netherlands	<ul style="list-style-type: none"> – take care for a good communication with all parties about changes, – make regulations and calculation methods not too complex, – the high of the EPC must be in accordance with enough available techniques, – give the market sector the time to accept the new approach and to let them anticipate concerning the changes, – take care that also innovative concepts are dealt with in the calculation method, – avoid if possible the need of the principle of equivalence (much discussion).

Poland	The basic existing technical regulation is 10 years old, and there are different opinions about it as e.g. complaints as being too complex but also the opposite that it is good that it is comprehensive. There are no doubts about the needs of updating it due to the new requirements. One of the important achievements is organisation of consultancy process with public and intergovernmental entities. Very important in the updating process is the insight into the regulation approaches of other Member States.
Portugal	None so far. However, it is clear that designers are still learning (applications for building permits must show compliance with the new regulations) and building promoters, especially, are complaining about added costs and delays when designs have to be corrected when first submitted and not meeting regulations (this was expected, of course, and it is no surprise).
Romania	Minimum requirements for individual components are easier to handle than the 25 % rules. Compliance mechanism can be improved to ensure that the rules are being followed. It is necessary to have a guide or a list of retrofitting measures that seems to be a good and easy way to improve the energy performance of the existing building stock.
Slovak Republic	-
Spain	Changes are slower than forecast.
Sweden	No lessons so far.
Switzerland	Recommendations applied on a voluntary basis are much less efficient than a strict rule. For example, it was proven and teaching in since 1975 to many architects that 10 to 20 cm thermal insulation improves comfort and is economically efficient, but such insulation thicknesses were generally used only when the state regulations were applied by the end of the last century.
UK	-
England & Wales	

6.6.2 Use of lessons learned in future revisions of relevant regulations

As there are a relatively limited number of lessons learned, the implementation of revisions as a result of the lessons learned is similarly limited. However in many MS it is anticipated that these new rules will be reviewed over the next years, and lessons then collected. This will possibly lead to revisions.

Table 25. Question: Will these lessons lead to revisions of the relevant regulations, and if so in what way?

Country	Answer
Austria	The transposition of the EPBD in Austria is not completed yet.
Belgium Flemish region	-
Croatia	-
Cyprus	Not in the near future.
Czech Republic	Renovations will lead to change of the structure of energy audits (Decree No. 213/2001 Coll. on energy audits scheme).
Denmark	The lessons learned will be taken into account, but whether they will lead to revisions of the regulations is at preset uncertain.
Estonia	Probably yes, attention on energy use in buildings in Estonia is increasing.
Finland	-
France	A study to know how this first thermal regulation on existing buildings is followed is planned. It will lead to conclusions in order to enhance the regulation.
Germany	The maximum U-value requirements for renovations will be strengthened in 2009. The required retrofitting measures shall be extended (not only old boilers and not yet insulated, but not workable but reachable ceilings to the attic). The upcoming energy decree foresees additional obligations.

Greece	-
Hungary	The regulation will be reviewed every 5 year, next revision in 2011.
Italy	Possibly.
Latvia	-
Lithuania	Too less of experiences.
Norway	We hope that the coming certification-system will promote energy-measures in existing buildings and then a higher fulfilment of the requirements for renovations.
Netherlands	The revised calculation must be easier and more innovative concepts will be available in the calculation method.
Poland	Yes, we hope. However an effort to harmonise the methodology with CEN standards requires collection of energy performance data that have never been collected before. All buildings in Poland are equipped with heat meters and many with cost allocators, but the data about the use of the building and temperatures outside and inside are not collected. Thus the plan is to set new component regulation and to monitor operational energy performance, adjusting the calculation of energy use to the properties of the building stock. Afterwards, the energy performance requirements will be elaborated.
Portugal	Everything shall be taken in account when time comes for review. No plans yet exist, however.
Romania	It is intended to improve the actual regulations very soon.
Slovak Republic	-
Spain	-
Sweden	No comment.
Switzerland	A new recent regulation makes solar water heating mandatory for new buildings. Such systems are economically sound since the eighties but were built only by a few "green" people.
UK	Yes, revisions are always subject to public consultation and Impact Assessment –
England & Wales	currently starting for 2010 revisions.

6.7 Link between renovation of buildings and national certification schemes

In general there is a link between the energy certification schemes and building renovation, but not necessarily the opposite way. Energy certification is certainly a way of focusing interest on energy performance improvements in conjunction with renovations, while renovations do not necessarily imply the issuing of a new certificate. In some MS however, a new certificate must be issued after a major renovation. In Spain for instance, if a renovated building achieves a certain label in the certificate, there will be coverage of a certain percentage of the renovation cost by the state, and in Poland, coverage of 25 % of the certificate cost.

In Germany there is a direct link, but only if the building owner applies for funding by the government-owned KfW-bank, he has to provide a certificate for the status after the retrofit.

Table 26. Links between certification building energy schemes and rules for renovation. The green column shows the summary for EU27. The yellow column includes Croatia, Norway, and Switzerland.

	AT	BE	BG	CY	CZ	DK	EE	FI	FR	DE	GR	HU	IE	IT	LV	LT	LU	MT	NL	PL	PT	RO	SK	SI	EP	SE	UK	HR	NO	CH		
	Austria	Belgium (Flanders)	Bulgaria	Cyprus	Czech Republic	Denmark	Estonia	Finland	France	Germany	Greece	Hungary	Ireland	Italy	Latvia	Lithuania	Luxembourg	Malta	Netherlands	Poland	Portugal	Romania	Slovak Republic	Slovenia	Spain	Sweden	UK (England&Wales)	Croatia	Norway	Switzerland	EU27	EU27+3
3.11	Describe whether there is a link between renovation of buildings and your national certification scheme																															
Link					x	x	x		x	x	x		x		x				x	x	x	x			x		x	x	x	x	10	10
No link	x	x		x				x	x	x		x		x	x								x								12	15

Table 27. Question: Describe whether there is a link between renovation of buildings and your national certification scheme.

Country	Answer
Austria	-
Belgium Flemish region	The U-values in the report of a renovation can be used as input to calculate the energy performance of the existing building for the certificate. It will mostly be better than the default values in the system of existing buildings.
Croatia	At the moment certification scheme is not prescribed.
Cyprus	No link unless a renovation results in material alteration of the energy efficiency of the building, case in which the certificate shall be revised if the building is for sale or rent.
Czech Republic	Yes, certification scheme is an incentive for renovations. The profitable measures listed in the certificate/energy audit are those which shall be normally implemented.
Denmark	Yes for new buildings. No for renovation, but when the 25 % limit is exceeded, the profitable measures listed in the certificate are those that have to be investigated further and usually implemented. In public (governmental) buildings, all profitable measures (simple pay-back time less than five years) have to be carried out within four years of identifying them in an energy certificate.
Estonia	Yes, major renovation is based on design documents, one part of these documents is energy certificate that gives an estimate of expected energy consumption after the renovation.
Finland	No.
France	-
Germany	A renovation of a building does not require a new EP certificate. EP certificates are only necessary in case of new construction, sale, rent or for public buildings as hang-out. If the building owner applies for a funding by the statelY owned KfW-bank he has to provide a certificate for the status after the retrofit. (Other types of funding are though possible by only realising defined U-values and building systems efficiencies).
Greece	For buildings over 1000 m ² , after a major renovation there will be a certification.
Hungary	Certification scheme is still pending.
Italy	Certification includes recommendations for improvement, which can be used in planning renovations.
Latvia	-
Lithuania	The certification of buildings is obligatory.
Norway	We support and hope for a strong link here.
Netherlands	Renovated buildings fulfil the requirement of new building. For new buildings is an extra certification not needed for the coming 10 years.
Poland	Every building undergone thermo-modernisation (mandatory), extension or renovation if the energy performance is changed should have elaborated energy performance certificate. In case of thermo-modernisation it is possible to get 25 % of certificate cost refunded by the system.
Portugal	The qualified experts that will issue the energy certificate can only issue it after checking full compliance with building regulations on site. Without the certificate, the use licence is not issued either.
Romania	These aspects are treated together all the time.
Slovak Republic	-
Spain	There is a subsidy line for retrofitting linked with the certification: if you make an energy audit and follow its indications IDAE (by the regional government) will pay you the 75 % of this cost. After that if thanks to that you are a letter "A" you receive 35 % of the retrofitting cost or 27 % if you achieve a "B" label.
Sweden	As the renovation most likely will give at least a little gain in energy efficiency, the building owner at least has the possibility to make a new certificate.

Switzerland	The certification scheme (to be published) includes both new and existing buildings and, for those, recommendations for improving the energy efficiency.
UK	Not explicitly.
England & Wales	

6.8 Best practice examples in national legislation

Only eight of the MS, which answered the questionnaire, have given feedback on best-practice examples of the national legislation regarding building renovation and the connected energy performance regulations.

Among the few best examples are:

- Lowering of the 1000 m² threshold to zero (or the minimum building size covered by the national building regulations) that includes the entire building stock.
- Specific requirements for certain systems or components regardless of the size of the renovation are easier to administer and understand. Energy improvements according to standards for new buildings are implemented for renovations less than "major" e.g. in Denmark roof replacement, renovation of climate shield, replacement of windows, replacement of boiler, and change of heat supply.
- In Germany there are energy improvement requirements independent of a foreseen renovation action: uninsulated heating pipes must be insulated, unefficient boilers exchanged, and certain ceilings to the attic insulated.
- The building type, not the size, determines if a building is subject to the major renovation rules.

Table 28. Question: Describe the best practice example for your national legislation regarding renovation of buildings in relation to the defined area limit and the 25 % rule.

Country	Answer
Austria	-
Belgium	-
Flemish region	
Croatia	-
Cyprus	-
Czech Republic	For the Czech Republic the certification represents the simplification because as the limit for the execution of an energy renovation was used the energy consumption for heating and the local boiler room or district heating scheme.
Denmark	A Danish best example is that the building type and not the size determine whether the 25 % rule is active. Furthermore there are individual, profitable measures which have to fulfil the requirements, regardless of the size of the renovation: roof replacement, renovation of climate shield, replacement of windows, replacement of boiler, change of heat supply.
Estonia	-
Finland	-
France	-
Germany	A German best practice example is that we really have general retrofit requirements: <ul style="list-style-type: none"> – un-insulated heating pipes have to be insulated if the building owner changes, – old boilers have to be replaced, – not yet insulated, not walkable but reachable ceilings to attic have to be insulated. This means that we have actually started to set requirements that have to be met without having a major or minor renovation.
Greece	-

Hungary	Independent on the EPBD a block of flats (42 flats, prefabricated sandwich panels) has been retrofitted: energy saving exceeds 80 % (the SOLANOVA demo project).
Italy	Not applicable.
Latvia	-
Lithuania	Building under major renovation – In the present Regulation building under major renovation means a building in which the costs of implemented energy saving measures will exceed 25 % of residual value of building under reconstruction or overhaul repair, the value of building site excluded.
Norway	-
Netherlands	?
Poland	No such examples.
Portugal	This question is not clear. Major renovations simply require a more efficient building envelope (better insulation and better solar protection) as well as an efficient heating and cooling system (if any is installed).
Romania	There are individual, profitable measures which have to fulfil the requirements, regardless of the size of the renovation.
Slovak Republic	-
Spain	-
Sweden	-
Switzerland	The best practice is the (private) Minergie P rating. This rating has no floor area limit and no 25 % rule. It gives a label to buildings using less than 30 MJ/m ² for heating, cooling, ventilation and hot water, equipped with heat recovery on exhaust air and in which all electrical appliances are labelled A according to EC rules. The airtightness of the envelope is checked and should be better than a given limit. There are on site checks to provide this label. The cost of these checks is supported by the building owner. This is not a regulation, but a private rating. See www.minergie.ch for more information.
UK England & Wales	Not sure what this means.

6.9 Support systems to stimulate investments in energy efficiency improvements of the buildings

Most MS have some kind of economic systems to promote and stimulate implementation of energy saving measures. In general these are related to individual building components or systems and not to the overall energy performance of the renovated building, but some MS have both systems. The economic benefits can be either reduction of taxes or cheaper loans, or direct subsidies for installing certain high-performance building elements or systems.

In Austria for instance, there is a social housing subsidy scheme for energy-improved buildings. And in Romania, the owners must pay only 1/3 of the cost of investment in energy renovation if they are granted support under a national programme.

Table 29. Question: Describe support systems, if any, to stimulate investments in energy efficiency improvements of the buildings? Are they linked with the energy performance requirements/certificates and how?

Country	Answer
Austria	Social housing subsidy scheme: regulated on the level of the provinces in Austria. To receive public subsidy it is obligatory to present an energy certificate according to EPBD in new construction and in comprehensive renovation.

Belgium Flemish region	Tax reduction for insulation of roofs and high performance glazing. The requirements to get the tax reduction are the same or higher than the requirements that must be fulfilled. Subsidies.
Croatia	There are no support systems.
Cyprus	There is financial incentives through the Support Scheme for the Conservation of Energy and the Promotion of RES.
Czech Republic	State Programme for the Support of Energy Savings and the usage of renewable energy sources (financial resources from the State Budget), programme PANEL (support of renovations of blocks of flats), financial resources from structural funds.
Denmark	There are no financial support schemes to promote energy efficient renovation of buildings.
Estonia	There is not any national scheme to promote energy efficiency investments in buildings right now. Transition from national schemes to schemes partly financed from European Regional Development Fund is hindered by different interpretation of SF regulation by Estonian authorities and Commission services. There will be no link with energy performance requirements and certificates, as energy audits will be the source of information to find out, if the potential energy efficiency improvement is adequate (it is proposed, that supported projects should deliver at least 20 % savings).
Finland	We have financial support for renovation and energy efficiency improvements. Grants are awarded for residential buildings. They are aimed at reducing both energy consumption and emissions of greenhouse gases. Grants are awarded for example for energy audits, for adding extra insulation to walls and roofs, for installing or improving the heat recovery of ventilation, for improving heating systems, and for implementing renewable energy sources. The grant covers 40 % of the actual costs of the audit and 10-15 % of the other measures. Grants are not linked with the energy performance requirements or energy certificates.
France	There are several support systems in order to encourage building owners to improve the performance of their building/housing. One of the most used in France is a Tax reduction based on the cost of components or system that enhance the performance of buildings: Windows with maximum U Value, insulation, boilers, heat pumps. This system is linked with the regulation, since the requirements for the tax reduction are always higher than the requirements of the regulation.
Germany	There are cheaper loans and direct funding systems offered by the state owned bank (KfW) for different combinations of retrofits at certain components/systems. Additionally there is a demonstration programme called "low energy houses for the existing building stock" with funding to selected building owners based on the energy demand after the retrofit. Both systems however give money only to building owners which exceed with their renovation the requirements of the energy decree.
Greece	Tax refund system for thermal insulation of building shell (not linked with the certification process at the moment).
Hungary	The Green Investment Scheme is about being implemented – it will be linked with the certification.
Italy	Tax deduction of 55 % for all renovation costs.
Latvia	-
Lithuania	Only tools for energy certification are supported.
Norway	Enova (Enova SF is a public enterprise owned by the Royal Norwegian Ministry of Petroleum and Energy) support big energy savings measures economically, as long as they go beyond the minimum energy requirements.
Netherlands	In the Netherlands there are subsidies programs available to push investment in demonstration and research concerning energy saving items in the build environment (SDE, EOS, UKR, warm wonen, SBIK).
Poland	There is a thermo-modernisation supporting system, existing since 1998, according to it, the owner of building (no national administration) can get bonus equivalent to 25 % of the loan taken for investment if the investment fulfils certain energy savings and feasibility conditions, and it is justified by verified by third party in an energy audit.

Portugal	Renovations to type A class or better will be able to claim an income tax rebate.
Romania	As a financial support scheme to promote energy efficient renovation of residential buildings is a "National Programme of Rehabilitation of existing residential building" supported by the Ministry of Development, Public Works and building, where the owners must pay only 1/3 of the cost of investment for the renovation.
Slovak Republic	There are some support systems, which are linked to energy savings and energy certificates.
Spain	There is a subsidy line for retrofitting linked with the certification: if you make an energy audit and follow its indications IDAE (by the regional government) will pay you the 75 % of this cost. After that if thanks to that you are a letter "A" you receive 35 % of the retrofitting cost or 27 % if you achieve a "B" label.
Sweden	Windows with U-value less than 1.2 is supported in old single-family houses when renovating. Support can be given when solar-heating systems are installed.
Switzerland	Buildings having a Minergie label may have lower interest rate in some Banks. Some states also give financial support for those buildings.
UK England & Wales	There are various schemes, especially energy-supplier regulatory requirements for housing (particularly for fuel poverty) and, to some extent for SME's. But these pre-date the EPBD and are not explicitly linked to it at present.

7 References

- Directive 2002/91/EC of the European Parliament and of the Council of 16 December 2002 on the energy performance of buildings. OJ L 1, 4.1.2003, p. 65–71.
- Cost-Effective Climate Protection in the Building Stock of the New EU Member States, Report established by ECOFYS for EURIMA, www.eurima.org, August 2005.
- ENPER EXIST WP4 Report.
www.enper-exist.com
- EPBD Buildings Platform information papers from the MS.
www.buildingsplatform.org

8 Annex 1 - Questionnaire



Specific study in relation to the EPBD

Questionnaire concerning:

Benefits and limitations of thresholds related to the 1,000 m² limit and the 25 % rule regarding the definition of major renovations (EPBD Article 6)

Contact person: Kirsten Engelund Thomsen, Danish Building Research Institute, SBI
e-mail: ket@sbi.dk

The objective of this study is to support the EC DG-TREN (European Commission, Directorate-General for Energy and Transport) in gaining a better understanding of the impact of the EPBD. This study deals with the benefits and limitations of thresholds related to the 1 000 m² limit and the 25 % rule (Preamble 13) regarding the definition of major renovations (EPBD Article 6).

EPBD: Article 6 – Existing buildings: Member States shall take the necessary measures to ensure that when buildings with a total useful floor area over 1 000 m² undergo major renovation, their energy performance is upgraded in order to meet minimum requirements in so far as this is technically, functionally and economically feasible. Member States shall derive these minimum energy performance requirements on the basis of the energy performance requirements set for buildings in accordance with Article 4. The requirements may be set either for the renovated building as a whole or for the renovated systems or components when these are part of a renovation to be carried out within a limited time period, with the abovementioned objective of improving the overall energy performance of the building.

EPBD: Preamble 13: Major renovations of existing buildings above a certain size should be regarded as an opportunity to take cost-effective measures to enhance energy performance. Major renovations are cases such as those where the total cost of the renovation related to the building shell and/or energy installations such as heating, hot water supply, air-conditioning, ventilation and lighting is higher than 25 % of the value of the building, excluding the value of the land upon which the building is situated, or those where more than 25 % of the building shell undergoes renovation.

The study is within the Buildings Platform contract and may support DG TREN in the evaluation of the possibilities for the forthcoming revision of the EPBD. Due to time limitations it is of high importance that you, or one of your colleagues, answer the questionnaire promptly.

A report has to be finished before summer, which includes a statistical analysis, pros and cons of the different present regulations and how they could be improved as well as descriptions of best practice examples.

We would be very grateful if you would fill in the questionnaire and return it to Mrs. Kirsten Engelund Thomsen no later than 16 May 2008. If you have any questions regarding the questionnaire, please do not hesitate to contact Kirsten or Mr. Kim B. Wittchen (kbw@sbi.dk).

Please note that all questions are related to *renovation of existing buildings*.

If there is more than one region in your country, please fill in a questionnaire for each region. If necessary, please forward the questionnaire to a colleague.

All personal data will be kept confidential and anonymous in any publication!
Thank you in advance!

General information

- Country: Region:

Filled in by:

- Name:
- Organisation:
- e-mail:
- Phone:
- Date:

1. Questions concerning major renovations (25 % rules)

- 1.1 Describe your national definition of a major renovation:

- 1.2 How are the terms "technically, functionally and economically feasible" as stated in Article 6 of EPBD interpreted in the national implementation?

2. Questions concerning the 1000 m² limit

- 2.1 Describe your current national regulation regarding the implementation of the 1000 m² limit including any other requirements related to area limits:

- 2.2 Describe your planned national regulation regarding the implementation of the 1000 m² limit including any tighter requirements:

- 2.3 Describe the arguments based on which the level of limit was determined:

- 2.4 Indicate the share of the building stock and average final (final energy, delivered to the buildings) energy use that needs to follow your national area limit, if any. If possible, make a break-down in different building types and/or give an estimate for the total building stock:

Building type	Area limit for the different building types	Share of floor area covered by the m ² limit, for each building stock type covered by your area limit	Total floor area of this building type in your country,	Heating ¹ (including electricity for heating)	Electricity (excluding heating)
	[m ²]	[%]	[million m ²]	[kWh/m ²]	[kWh/m ²]
Single family houses of different types	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Apartment blocks	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Offices	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Education buildings	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Hospitals	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Hotels and restaurants	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

Sports facilities					
Wholesale and retail trade services buildings					
Other types of energy consuming buildings					
Total building stock					

Other remarks:

3. Other questions concerning renovation of existing buildings

3.1 How are energy performance requirements for renovated buildings defined?

For the renovated systems or components (e.g. windows, boiler, roof, ventilation system, etc.); for the renovated zone of the building (e.g. a wing of the building); or for the building as a whole?

3.2 How is the system or component requirements defined? Is it direct component requirements, e.g. U-values or efficiencies or is it requirements to the total energy consumption based in final, primary or CO₂?

3.3 Are the national requirements based on the CE labelling of the component or system, if it exists for the component or system?

3.4 Describe other energy requirements that have to be fulfilled when undertaking renovation of buildings:

3.5 Describe compliance mechanisms and how rigorously they are applied:

Are there authorities checking their realisation on site?

3.6 Are fines or similar penalties when the requirements are not met?

3.7 Describe the efficiency and cost of the compliance mechanisms, if already studied:

3.8 Describe pros and cons regarding present regulations and how they can be improved:

3.9 Describe lessons learned regarding present regulations:

■

3.10 Will these lessons lead to revisions of the relevant regulations, and if so in which way?

■

3.11 Describe whether there is a link between renovation of buildings and your national certification scheme:

■

3.12 Describe the best practice example for your national legislation regarding renovation of buildings in relation to the defined area limit and the 25 % rule:

■

3.13 Describe support systems, if any, to stimulate investments in energy efficiency improvements of the buildings? Are they linked with the energy performance requirements/certificates and how?

■

3.14 Other remarks:

■

This study deals with the benefits and limitations of thresholds related to the 1,000 m² limit for existing buildings that undergo major renovation (Energy Performance of Buildings Directive Article 6) and the two 25 % rules regarding the definition of major renovations (recital 13). These thresholds are important instruments for ensuring that energy performance improvements are carried out in conjunction with renovation of existing buildings. A recast of the Energy Performance of Buildings Directive is about to be made and it is therefore essential to know how these thresholds has been handled until now in the European member states. As part of this study, a questionnaire was circulated in the spring 2008 to representatives from the 27 Member States of the European Union plus Croatia, Norway and Switzerland.

This study presents the situation of the Member States as of June 2008. The study is based on the information provided by the respondents and not on analysis of legal texts therefore omissions may be possible.

1. udgave, 2009

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